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PRESIDENTIAL ADDRESS*

AMERICAN GYNECOLOGICAL SOCIETY

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NOTHING in my medical career has given me greater pleasure than to be elected to the distinguished office of President of this Society, and I wish to extend to the Fellows my sincere thanks for the honor bestowed upon me one year ago. I know of no position within the gift of the medical profession that I could prize more highly and I feel deeply the distinction accorded me.

At this time it is my painful duty to record the name of Dr. Harold Capron Bailey, a former member of this Society, who died during the past year. Dr. Bailey was a keen scientist, and his loss will be felt by many without as well as those within this Society. The death of Dr. Charles M. Green is regretted by all who had the privilege of knowing him. We have also lost through death during the past year our Honorary Fellow, Dr. Theodore Tuffier of Paris. Dr. Tuffier was perhaps best known to the gynecologic world by his work on ovarian transplantation. He was a skillful operator, and a surgeon of wide experience and excellent judgment.

In this, the oldest national gynecologic society in the world, the presidential chair has been occupied by the most illustrious members of our branch of the profession. A study of the Transactions of former years reveals the fact that the presidential addresses of my predecessors are uniformly of a commensurately high order, and reflect the brilliant

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attributes and erudition of their distinguished authors. While these findings tend to enhance the honor that you have conferred upon me, they also serve to magnify my own shortcomings and render more difficult the selection of a suitable topic for my address.

To follow the masterly achievements of Chipman, Miller, Ward, Brettauer, Hirst, and Curtis, to mention at random only a few of the most recent workers, but augments the present difficulty.

To glance in retrospect at conditions prior to the organization of this Society is not lacking in interest. Haggard has recently pointed out that the progress and retrogression of civilization are nowhere more clearly apparent than in the study of childbirth. Among primitive peoples childbirth is considered a natural process, and hence is treated with indifference or even with brutality. At the height of the Egyptian, Greek and Roman civilization the childbearing woman was accorded definite consideration, and the art of obstetrics had reached a considerable stage of development. The technic and indications for version were known, and the obstetric chair and vaginal speculum in common use. With the advent of Christianity practical measures to facilitate childbirth were more or less replaced by prayer and faith, and the fact that the mediæval Christian viewed childbirth as a process the result of carnal sin and that was to be expiated by pain, militated against progress along this line. Indeed, until comparatively recent times the old indifference to the suffering of women during parturition, and the religious opposition to the employment of anesthetics for the alleviation of the pain, constitute a peculiar chapter in medical history. It was not until Sir James Y. Simpson in an effort to overcome this prejudice directed his logical and humane arguments at some of the leading divines of his time that the opposition of the clergy was finally overcome. The administration, with her consent, of chloroform during one of her confinements, to the late Queen Victoria, marked a further advance in the use of obstetric anesthesia.

For many centuries the mortality attending childbirth was enormous. The really primitive woman has little cause to fear childbirth unless a malposition exists. In the present day, however, there are but few races that have not been brought into contact with civilization, and as a consequence the lives of their women and their offspring are threatened by mongrelization, venereal diseases, rickets, tuberculosis, and alcoholism. Often, too, they become the victims of filthy midwives or of unclean physicians. Garrison describes obstetrics as the worst phase of Renaissance medical practice. Our knowledge of mediæval obstetrics is meager, but one may gauge the extent of its abasement by the manner in which labor was conducted during the Middle Ages. Garrison states that in normal labor a woman had an even chance for life. Puerperal fever and eclampsia were the chief factors influencing the mortality. When dystocia occurred, the patient was usually sub-

jected to the deadly ministrations of a "Sairey Gamp" or a vagabond "surgeon," or perhaps even a swineherd. In 1580 a law was passed in Germany that had for its object the restraining of shepherds and herdsmen from officiating at childbirth. It was not until the Sixteenth Century that real progress in the practice of obstetrics was apparent. Up to this period, and even later, it was generally believed that, as a result of labor pains, the pelvis opened out like a broken hoop, permitting an easy exit for the child. So learned and accurate an observer as Ambroise Paré accepted this theory. He, however, brought to light and clearly described podalic version, which had been practiced among the ancient Greeks, and which was probably first employed about 200 A.D. by Soranus, and is described in detail by him in his treatise on midwifery and diseases of women.

During Paré's time a school for midwives was established at the Hôtel Dieu. It was during the Eighteenth Century that the care of women during childbirth began to pass from the midwife's hands to those of the trained accoucheur. In 1628 Peter Chamberlen attended Queen Henrietta Maria during a miscarriage, and thirty-five years later Boucher served in the capacity of obstetrician to La Vallière. In 1692 Hugh Chamberlen delivered the future Queen Anne.

In these early days male obstetricians merely acted in the capacity of assistants, and in some cases they were excluded from the delivery room unless complications arose. In England the change in public sentiment was largely due to the efforts of William Smellie and his pupil, William Hunter, and in Ireland to Sir Fielding Ould. On the Continent the case of the male accoucheur was upheld by Röderer in Göttingen, Campes in Amsterdam, Baudeloque and Levret in France, Boër in Vienna, and Saxtorph in Copenhagen. Smellie conducted a course in obstetrics employing a leather-covered manikin supported by a human pelvis. He also devised a specially designed curved and double curved forceps, and invented a steel lock for these instruments, which had formerly been usually bound together with thongs. Hunter was the first to describe the decidua reflexa, and to make accurate studies of the pregnant uterus. His disastrous experiment on himself, which resulted in the retardation, for upward of seventy years, of the scientific treatment of gonorrhea, is too well known to require description. Hunter was a vigorous opponent of the use of the obstetric forceps, and was wont, in substantiation of his belief in noninterference, to exhibit to his students his own rust-coated instruments. In 1773, Charles White, a Manchester surgeon, published an admirable treatise on obstetrics, which embodied the results of considerable pioneer work on aseptic midwifery, and stressed the importance of scrupulous cleanliness in the conduction of childbirth.

The mechanism of labor was first described in 1701 by Deventer, and later by Sir Fielding Ould. There is nothing in medicine more inter-

esting than the history of obstetrics. The charlatan Chamberlen, the courageous Mariceau, the scholarly and astute Holmes, the pathetic Semmelweis, the brilliant but obstinate Hunter; Pasteur, Lister, McDonald, Atlee, Sims, Tait, Noeggarth, the dramatic discoveries of Long, Morton, Wells, and Simpson, these go to make up the most fascinating chapters in the history of medicine and have been graphically described before to this Society in previous presidential addresses.

Prior to 1850 operative gynecology as an independent specialty had no real existence. Among the few contributions may be mentioned Robert Houstoun's treatment of ovarian dropsy by tapping in 1701; fifty-six years later William Hunter's proposed excision of ovarian cysts, and in 1770 his important observations upon retrodisplacement of the uterus; Matthew Baillie's study of dermoid cysts in 1789, and Soemmerring's essay on the injurious effects of corsets in 1793.

In response to an invitation issued on May 24, 1876, a group of gynecologists from various parts of the United States met at the Hall of the Academy of Medicine, New York City, on June third of that year, for the purpose of organizing a Gynecological Society. The meeting was called to order by James R. Chadwick, of Boston, and The American Gynecological Society was formed with thirty-nine members. Edmund R. Peaslee served as chairman. The first annual meeting was held on September 3, 1876, and Fordyce Barker was elected president. At this meeting a number of noteworthy papers were read including those by Emmet, on plastic surgery, and by Noeggerath, on latent gonorrhea. The latter's views were vigorously opposed by the members, one speaker going so far as to state that "One regards leucorrhea as a natural condition, present in all women after marriage."

At the time of organization, fifty-four years ago, obstetrics as practiced today was unknown. Since then the treatment of practically every obstetric complication and gynecologic condition has undergone radical changes, and improvement has taken place along all lines. During those early days cesarean section was attended by an enormous mortality, whereas now it it a common procedure and a life-saving measure. In those days extrauterine pregnancy usually terminated fatally.

Sired by surgery and the legitimate offspring of obstetrics, gynecology has shed its swaddling clothes and emerged a full-fledged entity, to become one of the foremost specialties of our time.

The Transactions of this Society constitute a complete record of the development of obstetrics and gynecology to the present time. Every obstetric or gynecologic procedure is described and discussed therein, the steps in the development of the art as well as the various theories advanced regarding the etiology and nonsurgical treatment of the diseases of women. The discussions were formerly more vigorous and controversial in nature than they are today.

I congratulate the Fellows of this Society upon the character of their work and particularly the members of the Council, those of the past as well as of the present. Every decade has shown definite advancement, both in scientific achievements and in developing more efficient methods of relieving our patients.

Brilliant and interesting as the past may have been we must also consider the future, for in it lies the very existence of our organization. In his presidential address to the American Medical Association a few years ago, Charles H. Mayo stressed the need for cooperation in the profession. "The medical man, taken individually, is usually self-sacrificing and patient, and aims to uphold the tenets of his calling. On the other hand, taken collectively, we of the profession do not possess sufficient influence, due largely to a lack of unity." Society as a whole appreciates the saving of a human life, but fails to realize the vast advantages of prophylactic surgery and obstetrics. America leads in operative gynecology, but lags in research work, although the last few years have shown a definite improvement in this field of endeavor. The late John G. Clark, in his presidential address before this Society, brought out a fact that is worthy of repetition, namely, that but few men are capable of doing really good research work. In every graduating class there are perhaps one or two men who are qualified to undertake this branch of investigation. All too often, due to a lack of financial resources or for other reasons, these workers are forced to enter other more profitable fields. A system should be devised whereby such workers may be encouraged and permitted to follow the bent for which they are most suited, in a field in which workers are so urgently needed. It should be stressed further that although research is of the utmost value, it is useful only when it is directed along practical lines. This is a point that I wish to emphasize and one that it is difficult to correct without hampering the research worker. It is nevertheless a fact that today much time and labor are wasted in misdirected efforts in our research laboratories. The laboratory that is dissociated from the clinic is generally of little or no value so far as the advancement of the cause of medicine is concerned. It is most desirable that there be close cooperation between the so-called practical branches and the study of physiology. In teaching institutions occasional conferences between the heads of the Surgical, Gynecological, and Obstetrical Departments and the Professors of Physiology and Experimental Surgery will do much to direct laboratory work into practical channels, and inculcate into the minds of the students the value of properly directed research.

At the present day the infant and maternal mortality rate has shown but slow improvement, largely due to the fact that the majority of women are delivered by the general practitioner or the midwife. Obstetric teaching should stress the early recognition of complications rather

than the technic of treating them, and should aim to instill into the pupil's mind the importance of early hospitalization for all such cases, as well as the need for employing aseptic methods. It is my belief that the average obstetric case goes through labor without an accurate diagnosis of the presentation having been made, and without recognition, on the part of the accoucheur, of the potentialities for dystocia. Prenatal care is often only a farce or may have been omitted altogether.

There is a tendency, in every age, to assume that the zenith has been reached, and every investigator has been prone to wish that he had been born sooner, in order that he might have been the one to discover some of the apparently almost self-evident advancements that have been achieved. In spite of the progress that has been made, both in invention and in technic, we are still at the portal, and only as the result of hard work and honesty may we enter the chamber which still holds so many of nature's secrets, and which it is our privilege to explore. Merely in the way of suggestion, and as the result of careful thought, it would seem to me that the following subjects especially require further development: The careful auditing of end-results, as suggested by Codman and as practiced by Ward and many others. Only as the result of such studies are we enabled to compare the effects of the various methods of treatment and of operation, a point that is too self-evident to require discussion. Unfortunately, follow-up studies are expensive, and the gynecologist and obstetrician is often too busy with the immediate needs of his patients to give sufficient time to this important part of his work. Hospital chiefs should demand that their institution managers provide a qualified staff to conduct a follow-up department, and should see to it that the work is properly carried out. Advancement in the treatment of malignant neoplasms and, in fact, in all gynecologic diseases, and in many obstetric complications, is impossible unless end-results are available for purposes of comparison, evaluation, and study. The histologic diagnosis of malignant neoplasms, especially those arising in the female genital tract, is a subject fraught with error and inaccuracy in many hospitals. The general pathologist especially is frequently ignorant of this important and practical phase of his work. The formulation of a simple method of classifying the advancement of genital carcinomas is urgently required, and such a classification this Society could standardize authoritatively. Until this is accomplished and accepted by the medical world we have no definite means at our command on which to base a prognosis in the individual case. The results secured in the treatment of any series of malignant tumors mean little unless the character and stage of advancement of the growths are known. A further study of histologic grading and radio-susceptibility of malignant genital neoplasms appears worthy of future efforts. An end-result study of the condition of children who have been delivered with the aid of the high forceps or by version is also desirable. The

fact that an infant is alive or even apparently well at the time of the discharge of the mother from the maternity hospital some twelve or fourteen days after delivery does not prove positively that no injury has been sustained that may later affect the health or mentality of the child.

There are many other subjects that occur to me as being especially worthy of investigation, but I do not wish to trespass further upon your time. I cannot, however, leave this subject of specific suggestions without a plea for a thorough and personal study of the individual case. Many mistakes are the result of undue haste. The improvement in operative technic and the consequent lowering of the mortality rate tend to lessen thorough preliminary study. There are few gynecologic symptoms that cannot be reproduced by nongynecologic conditions, and the busy gynecologist may readily develop the habit of gaging every ailment through the narrow confines of a bivalve speculum. Laboratory tests have been multiplied in number and improved in technic, but while reliance may be placed on them, we should not be altogether dependent upon them. Invaluable as they are, they should not be permitted to become the master of the clinician.

Speaking for the future of this Society, there is but little to say. We are well and safely guarded by an able Council. To our Secretary and Treasurer, present officers and past, our thanks are due for the able manner in which they have performed their arduous tasks. As was pointed out by Fordyce Barker in the first presidential address, the reputation of the Society is largely dependent upon the character of our contributions, and although our Council is empowered to accept or to reject papers, the duty of making the selection actually falls largely upon our secretary who, in common with those who have preceded him, has performed this important and difficult work with judgment and discretion.

The population of the nation is increasing rapidly. This must eventually result in an increase in the number of gynecologists and obstetricians, which may ultimately demand an augmentation of our membership. In my judgment this should be slow, and is not required at the present time.

In closing I wish again to express to you my deep sense of indebtedness for the honor you have conferred upon me; to thank you individually for the help and friendship you have given me in the past, and for a continuance of which I look hopefully forward to in the future.

THE INCIDENCE OF PUERPERAL INFECTION DUE TO ANAEROBIC STREPTOCOCCI*

By T. K. Brown, B.S., M.S., M.D., St. Louis, Mo.

OWING to the fact that frequently cases of puerperal infection were encountered in which repeated bacteriologic examinations had been negative, it was felt that these infections were probably due to anaerobic organisms, and to recover these organisms and to properly understand these cases, it would be necessary to incubate blood and uterine cultures under anaerobic as well as aerobic conditions. Since July, 1924, we have been incubating our uterine and blood cultures aerobically and anaerobically. In a very short time we were able to convince ourselves of the accuracy of Schottmueller's previous work, having found that anaerobic streptococci play a major part in puerperal infection in our clinic.

Schwarz and Dieckmann, in 1926, reported our experiences with puerperal infection from July, 1924, to September, 1926. They found that anaerobic streptococci were the most frequent offenders in their cases. Table I shows the summary of this report. It is my object in this paper to continue the report which now covers the time from July 1, 1924, to December 31, 1929, an additional period of three and one-fourth years. Since the publication of the article of Schwarz and Dieckmann, Harris and J. H. Brown have published several articles, which further indicate that anaerobic streptococci play a considerable rôle in puerperal infection. This is interesting, because before the report of Schwarz and Dieckmann, it was generally considered that Schottmueller's ideas concerning the frequency of anaerobic streptococcal infections were too sweeping.

Table I. Types of Puerperal Infection

Number of admissions July 1, 1924, to Sept. 1, 1926		Number of deliveries	Number of cases of puerperal infection		Number of deaths
2194		1913	45		10
Type of infection	Number of cases	Aerobic bacteria	Anaerobic streptococci	Mixed bacteria	Negative cultures	Mortality
Acute endometritis	42	11	27	3	1	0
Pelvic cellulitis	11	4	6	1		0
Peritonitis	7	1	4	2		6
Pelvic abscess	3	1	1	1		
Pelvic thrombophlebitis	9	0	6	0	3	3
Bacteriemia	15	4	10	1		1

With the exception of the recent investigations of Harris and J. H. Brown, and Schwarz and Dieckmann, no large amount of work

*From the Department of Obstetrics and Gynecology, Washington University School of Medicine, the St. Louis Maternity Hospital, and Barnes Hospital.

had been done on anaerobic streptococcal infections in the puerperium. Burckhardt, in 1912, discussed the question of sapremia and bacteriemia. He was able to show in several cases that organisms, which are usually regarded as saprophytes and as harmless inhabitants of the genital tract, could become invasive. These organisms were chiefly anaerobic streptococci. Friedrich, in the same year, reported a series of infections which were due to anaerobic streptococci, but owing to the fact that he obtained few positive blood cultures in these cases, he felt that these organisms were not so invasive as Schottmueller had led us to believe. Bingold, in Schottmueller's clinic in 1921, reported further on this work, and in 1923 Schottmueller recorded 72 fatal cases of puerperal infection following delivery due to anaerobic streptococci from a total of 231 fatal cases. In an article appearing in September, 1928, Schottmueller gives his most recent experiences and opinions concerning puerperal infection. He emphasizes the large rôle played by anaerobic streptococci, and feels that they offer just as great a problem as do hemolytic streptococcal infections. He thinks that these anaerobes are organisms which in most instances the patient herself harbors in contradistinction to other pathogenic organisms, which are usually introduced into the vagina from without. As he sees it, other pathogenic organisms can be kept out of the vagina by proper technic, but the anaerobic organisms are mostly ordinary inhabitants of the vaginal tract. He remarks, therefore, that the dangers of puerperal infection are greater from within than from without. The question of autoinfection was also raised by Schwarz and Dieckmann in their second report on this subject.

Harris and J. H. Brown, in January, 1929, published their experiences in 113 cases of streptococcic puerperal infection, covering a period from July 9, 1926, to August 9, 1927. In this very elaborate report, they concluded that 67 per cent of all their infections were due to various types of streptococci. Secondly, evidence is offered which seems to show that puerperal infection due to beta-hemolytic streptococci is almost invariably exogenous. Puerperal infection due to gamma-non-

TABLE II

	WHITE	COLORED
Aerobic:		
Beta	7	10
Alpha	0	1
Alpha viridans	5	7
Gamma	4	15
Anaerobic:		
Alpha viridans	3	2
Viridans (nonhemolytic)	0	1
Gamma	8	40
	27	76

hemolytic streptococci is probably endogenous in origin in most cases, and in their series they were found to occur five times more frequently in colored women than in white. Aerobic and anaerobic streptococci were found with almost equal frequency, which emphasized the necessity of anaerobic culture methods in suspected cases of streptococcic puerperal infection.

Harris and J. H. Brown, in their series of 113 cases of puerperal infection due to streptococci, differentiated these organisms into various groups, and Table II shows their incidence in white and colored patients.

From the work of Harris and J. H. Brown, it will be readily seen that anaerobic streptococci are of considerable importance in puerperal infection, and that they are most probably endogenous in character in the majority of cases, as suggested by Schottmueller, Schwarz and Dieckmann, and themselves.

We have classified the cultures from our cases of infection into the aerobic and anaerobic groups, but have not carried the cultural studies much further, up to the present time. Apparently there is a large number of anaerobic streptococci, which are similar enough to be grouped together, but varying somewhat in their cultural characteristics. Prevot has classified a few of these organisms. Harris and J. H. Brown also have classified their anaerobic streptococci as noted above. Many of the organisms found to be pathogenic did not answer the requirements of the Streptococcus putridus as described by Schottmueller, but produced clinical pictures of similar type, but of varying degrees.

The organisms are nonhemolytic streptococci, growing under anaerobic conditions, producing gas with a characteristic foul odor, and proteolytic as shown by digestion of meat media. The odor of the cultures is similar to the odor noted at the bedside. The pathogenicity of the organisms is apparently proportional to the proteolytic property of the organism. In a few cases we have found some anaerobic bacilli present, but these have always been in the minority, and evidently are relatively unimportant.

In Table III, which is a summary of our bacteriologic experiences in a period of five and one-half years, it will be seen that anaerobic streptococci are concerned in the majority of these infections. In comparing the septicemia cases in Table I and Table III, it will be seen that only one case of anaerobic septicemia was positively diagnosed clinically. Several of these cases came to autopsy and the same anaerobic organism, which had been previously isolated from the uterus, was recovered from various organs at autopsy. This indicates that the organisms do not live in the blood stream, but must be obtained in culture at time when dissemination from some focus is taking place. The best time is probably suggested by the occurrence of a chill.

In September, 1926, our attention was called to an article by Bessesen, in which he attempted to explain some ways in which uterine infection could take place during labor, and particularly emphasized the use of a mixture for instillation in the vagina during labor. This mixture contained glycerin, mercurochrome, and tincture of iodine. We have been using this preparation since September, 1926, in the following strength:

15 gm. mercurochrome crystals,
5 c.c. of one-half strength tincture of iodine, in
500 c.c. of glycerin.

TABLE III. TYPES OF PUERPERAL INFECTION

NUMBER OF ADMISSIONS JULY 1, 1924 TO DECEMBER 31, 1929		NUMBER OF DELIVERIES	NUMBER OF CASES OF PUERPERAL INFECTION		NUMBER OF DEATHS
7,579		6,407	112		21
TYPE OF INFECTION	NUMBER OF CASES	AEROBIC BACTERIA	ANAEROBIC STREPTOCOCCI	MIXED BACTERIA	NEGATIVE CULTURES	MORTALITY
Acute endometritis	108	30	61	16	1	0
Pelvic cellulitis	22	7	12	3	0	0
Peritonitis	14	2	6	6	0	11
Pelvic abscess	10	4	4	2	0	1
Pelvic thrombophlebitis	14	2	9	0	3	4
Septicemia	25	10	11	4	0	5
Cases of suspected endometritis	13	0	0	0	13	0

Bessesen reported improvement of results with this instillation. We have injected this mixture routinely in labor, at first only in colored patients, but during the last two years in all ward cases. Realizing that anaerobes are usually present in the vagina, we felt that the most practical way to combat these organisms would be by the use of some form of antiseptic solution or mixture. The use of Bessessen's mixture was aimed chiefly at anaerobic infections. It was not used because we thought that this was the best mixture, but we felt that our results with its use were at least suggestive of its value. We are now working on other preparations which we hope will prove even more valuable, as we feel that vaginal antiseptics will prove the most logical means of preventing these infections, which, once they are started, give rise to the most malignant types of thrombophlebitis and pyemia, to say nothing of other local lesions characteristic of the usual pathogenic organisms. Seven c.c. of this modified Bessesen preparation are instilled in the vagina, and repeated about every twelve hours if labor is prolonged. In waiting cases in which the membranes have ruptured before the onset of labor, the same amount is injected daily.

Table IV shows the comparison of the deaths on the basis of admissions of the first and second parts of the series. It is necessary to point out that the deaths following full time delivery due to infections

are very appreciably reduced. Also the morbidity from puerperal infection, chiefly cases of acute endometritis, has shown a very marked reduction. We feel these figures suggest that by the instilla-

TABLE IV. MORTALITY FROM PUERPERAL INFECTION

	ADMISSIONS	DEATHS	PERCENTAGE
July, 1924, to Sept., 1926	2,194	10	0.45
Sept., 1926, to Jan., 1930	5,385	11	0.20

Of the 10 deaths between July, 1924, and September, 1926, 5 were infected before admission.
Of the 11 deaths between September, 1926, and January, 1930, 7 were infected before admission.

MORTALITY FROM PUERPERAL INFECTION

	DELIVERIES	DEATHS	PERCENTAGE
July, 1924, to Sept., 1926	1,913	5	0.261
Sept., 1926, to Jan., 1930	4,494	4	0.089

MORBIDITY FROM PUERPERAL INFECTION

	ADMISSIONS	INFECTIONS	PERCENTAGE
July, 1924, to Sept., 1926	2,194	45	2.05
Sept., 1926, to Jan., 1930	5,385	67	1.24

MORTALITY PER NUMBER OF CASES

	NUMBER OF CASES	DEATHS	PERCENTAGE
July, 1924, to Sept., 1926	45	10	22.2
Sept., 1926, to Jan., 1930	67	11	16.4

tion of an antiseptic preparation which is retained in the vagina, we have appreciably reduced our morbidity and mortality in these cases. We think that this work is encouraging and further experiments should be carried out. Serologic and immunologic studies with these anaerobes should be made. However, we feel at present that the simpler and more practical method of attack against these anaerobes is by vaginal antisepsis.

Lash, producing active immunization of pregnant and puerperal women against hemolytic streptococci, has recently shown that the incidence of puerperal infection in 1216 women, who were not immunized, was 2.8 per cent, while in 1261 puerperal women, who were vaccinated with streptococcal vaccines and toxins, it was only 0.87 per cent.

In view of the experiences of Schottmueller, Harris and J. H. Brown, and our own, all pointing out that anaerobic infections play a considerable part in puerperal infection, the routine immunization of patients against hemolytic streptococci does not seem practical. It is, of course, well recognized that hemolytic streptococcic infections are introduced; therefore, by the proper technic and limited manipulations,

the incidence of these infections can be reduced to a negligible minimum. This is the experience of every well-regulated obstetric clinic as well as our own for the last five and one-half years. The greatest problem in puerperal infection as we see it, is the combating of these anaerobic infections. To do this, all clinics dealing with puerperal infections must incubate uterine and blood cultures both by aerobic and anaerobic methods; only thus the true incidence of anaerobic infections can be appreciated. With these facts generally recognized, methods will develop which should reduce very materially the incidence of this type of infection.

Of 55 cases of puerperal infection on the service of the St. Louis Maternity Hospital between August 15, 1927, and December 31, 1929, 30 patients (54 per cent) gave evidence of infection upon admission. This is an incidence of one case of puerperal infection in every 145 deliveries, with a mortality of 20 per cent. The incidence of infection in our material is almost four times as great in the colored women as in the white, as the following figures show:

Postpartum cases:		
White	19	or 1 to 186 admissions
Colored	16	or 1 to 48 admissions
Abortions:		
White	16	or 1 to 221 admissions
Colored	4	or 1 to 194 admissions
	55	

Table V is a brief outline of the fatal cases of puerperal infection in our entire series. It is interesting to note the duration of pregnancy and the condition of the patient as regards infection before admission to the hospital; and the type of organisms prevailing in those cases infected after admission. Several cases of Staphylococcus albus are noted. These cases, after a careful search, were traced to rubber gloves which were improperly sterilized, due to defects in the sterilizing apparatus. With these conditions corrected, these infections at once disappeared.

There has been a good deal of discussion as regards the conservative and more radical treatment of puerperal infection. Our technic is rather active, as has been fully described in the previous paper by Schwarz and Dieckmann. There also has been a good deal of discussion concerning the invasive character of anaerobic streptococci, and whether or not this invasiveness is increased in the case where the patient is treated entirely along conservative lines. We believe that conservative treatment in the face of an anaerobic infection is illogical, and hope to show this in another report on a study of the material removed at the time the uterus is cleaned out. The following outline of

TABLE V

PATIENT'S HISTORY NO.	DURATION OF PREGNANCY	INFECTED BEFORE ADMISSION	ABORTION		UTERINE CULTURE TYPES OF ORGANISMS	BLOOD CULTURE TYPES OF ORGANISMS	EXTENT OF PATHOLOGIC LESIONS AT DEATH	CHARACTER OF DELIVERY	AUTOPSY
			CRIMINAL	SPONTANEOUS					
B. H. 0-5832	20 wk.	No	–	–	None Strep. putridus	Hemolytic strep.	Endometritis septicemia	Ectopic unoperated	No. 2409 Coroner's case
0-6250	2 mo.	Yes	Yes		Anaerobic strep.	Strep. putridus An. strep.	Endometritis, infarct of lung, septicemia, pelvic thrombophlebitis		
0-6783	Term	No	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, pneumonia	Cesarean section	No
1867	36 wk. Induced	No	–	–	Anaerobic strep.	Anaerobic strep.	Acute endometritis, pelvic thrombophlebitis, septicemia, embolic pneumonia	Twins, first spontaneous, second breech extraction. Macerated fetus	No
3706	Term	Yes	–	–	Strep. hemolyticus	Strep. hemolyticus	Septicemia, peritonitis, endometritis, pneumonia	Spontaneous	No. 2784
4003	Term	?	–	–	Anaerobic strep.	Anaerobic strep.	Peritonitis, general pelvic abscess, endometritis, septicemia	Cesarean section	No. 2817
4173	36 wk.	Yes	–	–	Anaerobic strep.	Neg.	Pelvic thrombophlebitis, pulmonary embolus (Ca. of uterus)	Cesarean section. Supravaginal hysterectomy	No
4668	Term	Yes	–	–	Anaerobic strep.	Neg.	Peritonitis, general	Cesarean section. Supravaginal hysterectomy	No. 2828
4899	Term	Yes	–	–	Anaerobic strep.	B. coli Anaerobic strep.	Septicemia, endometritis, pelvic cellulitis	Instrumental, 11 days before admission	No
6504	Term	No	–	–	Staph. albus hemolyticus	Staph. albus hemolyticus	Endometritis, infarct of lung, peritonitis	Induced	No
6702	2 wk.	Yes	Yes	–	None	Strep. viridans	Septicemia, infarct of kidney and spleen, thrombosis of cerebral artery	–	No. 2949

							Septicemia, infarct of kidney and spleen, thrombosis of cerebral artery	–	No. 2949

TABLE V—CONT'D

PATIENT'S HISTORY NO.	DURATION OF PREGNANCY	INFECTED BEFORE ADMISSION	ABORTION		UTERINE CULTURE TYPES OF ORGANISMS	BLOOD CULTURE TYPES OF ORGANISMS	EXTENT OF PATHOLOGIC LESIONS AT DEATH	CHARACTER OF DELIVERY	AUTOPSY
			CRIMINAL	SPONTANEOUS					
M. H. 22	32 wk.	Yes	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, ruptured uterus	Breech with contracted pelvis	No. 3151 Autopsy Bl. culture, an. strep.
210	3 mo.	Yes	Yes	–	Staph. albus Anaerobic strep.	Staph. albus	Septicemia, endometritis, embolic pneumonia, pelvic thrombophlebitis	–	No. 3167
215	36 wk.	Yes	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, thrombophlebitis, embolic pneumonia (extreme postmortem autolysis)	O.P.D. Premature stillborn	No. 3172
1766	5 mo.	Yes	–	Yes	Strep. hemolyticus	Neg.	Endometritis, peritonitis pelvic abscess	Spontaneous	No. 3388
3447	Term	No	–	–	Nonhemolytic strep.	Nonhemolytic strep.	Septicemia, cerebral embolus, endometritis, bronchial pneumonia	Spontaneous breech (membranes ruptured 36 hr.)	None
5139	Term	Yes	–	–	None (culture of pelvic abscess-anaerobic strep. B. coli)	Neg.	Endometritis, pelvic abscess	O.P.D. Short labor	No. 3792
5298	5 mo.	Yes	–	Yes	Anaerobic strep.	None	Endometritis, peritonitis, appendicitis	Spontaneous	No. 3785
5915	38 wk.	? (Membranes ruptured 3 days before livery)	–	–	Staph. albus Anaerobic strep.	Neg.	Endometritis, peritonitis	Cesarean section	None
6112	Term	No	–	–	None (peritoneal culture, an. strep., Staph. albus)	Anaerobic strep. Staph. albus	Septicemia, peritonitis	Spontaneous with retained placenta, supravaginal hysterectomy	None
6148	Term	No	–	–	Staph. albus	Staph. albus	Endometritis, septicemia	Cesarean section	None

one of our recent cases clearly demonstrates the invasive character of these organisms under the conditions of conservative treatment.

The patient, who had missed one menstrual period, had a criminal abortion performed about three weeks after missing her period, and about three weeks before admission to the hospital. She was sent into the hospital on the medical service by an outside physician. Repeated blood cultures were negative and the history of abortion was not obtained until four weeks after the patient had performed it. Five weeks after the abortion, with the patient practically moribund, a uterine culture merely for diagnosis was taken, and a considerable amount of chorionic tissue was removed, in spite of the rather early pregnancy. Anaerobic streptococci and B. coli were obtained and many streptococci were found in the débris removed. The patient died the next day, and an autopsy was performed. Anaerobic streptococci were recovered from the pleura, lung, and the uterus. We feel that this case illustrates very definitely the invasive character of anaerobic streptococci in a case which is allowed to run its own course. A brief outline of the history of this case, and an abstract of the pathologic report follows.

Jan. 16, 1930. M. O. No. 23204. Admitted Barnes Hospital. Aged twenty-eight. Unmarried. C. C.: Weakness. Chills. Impression: pulmonary tuberculosis. Miliary tuberculosis. Septicemia with pelvis as focus.

Jan. 17, 1930. Blood culture negative.

Jan. 20, 1930. Widal negative. Blood culture negative.

Jan. 23, 1930. Blood culture: streptococcus which did not grow on subculture. Obtained history of criminal abortion done three weeks before admission.

Jan. 25, 1930. Blood culture negative. Obstetric consultation requested.

Jan. 26, 1930. Transfusion of 500 c.c. of blood by Unger method.

Jan. 27, 1930. Obstetric consultation. Diagnosis: pelvic thrombophlebitis. Transfusion: 550 c.c. citrated blood.

Jan. 28, 1930. Uterine culture and douche. Removal of placenta. Culture (Anaerobic streptococci, B. coli). Transfusion: 550 c.c. citrated blood. Blood culture negative. Sputum anaerobic streptococci.

Jan. 29, 1930. Slight improvement. Chill in afternoon. Transfusion: 550 c.c.; blood culture: anaerobic streptococci. Died.

Autopsy: endometritis. Thrombosis of uterine veins. Multiple abscesses of the lungs. Cultures from pleura, lung, and uterus show anaerobic streptococci. Those of spleen and peritoneum were negative.

Autopsy Report.—Body of a fairly well-developed, fairly well-nourished white female, aged about twenty-seven years, of average height and weight. Liver and spleen are considerably enlarged, dark purple in color, and markedly congested. The uterus is enlarged; no evidence of peritonitis. The veins leading from the pelvic organs are markedly engorged. No thrombus, however, is located in the larger vessels outside the uterus.

As the chest plate is removed, a number of small abscesses along the anterior mediastinal border of the lungs are noted. As the lungs are removed, numerous similar areas are seen as hard yellow dots or spots, measuring from 1.5 cm. to pin-point in size, and covered with fibrin over the pleural surface. Numerous small abscesses are seen throughout the lung substance, a little more numerous in the

lower lobes on both sides. They seem to be of different ages. Some of them are only small yellow dots, while others seem to be actual cavities, filled with blackish material. Undoubtedly all of them open into bronchi. One large one is located in the right upper lobe and measures 2 cm. in its greatest diameter, and burrows through the lung for a distance of about 5 cm.

No evidence of peritonitis.

The spleen is greatly enlarged and quite firm, dark purple in color. It measures 17.5 x 10 x 6.5 cm. and appears greatly congested. It offers some resistance to cutting. The pulp is firm, dark red in color, and cannot be scraped off readily with the knife. One small tubercle is seen.

All other abdominal organs outside the pelvis were negative.

The uterus is opened along the anterior surface. There is evidence of infection of moderate degree, but very little exudate into the cavity. The placental site is located in the fundus on the posterior wall.

Microscopic sections of the endometrium showed numerous organisms (streptococci) superficially. There are many small thrombi, the most superficial ones containing numerous streptococci. The right uterine and right ovarian vein showed organizing thrombi, but no bacteria could be demonstrated. The minute lung abscesses were loaded with streptococci.

CONCLUSIONS

Our experiences with anaerobic streptococcal infections in the puerperium during the last three and one-half years is very similar to that described in the previous report of Schwarz and Dieckmann in 1926. Puerperal infections due to ordinary pathogenic organisms in most instances are introduced infections, and infections due to anaerobic streptococci are usually endogenous. In the well-organized obstetric clinic, the problem of anaerobic streptococcal infection should be a greater one than infection due to the hemolytic streptococci and other pathogenic organisms. Good technic can practically eliminate hemolytic streptococcal infections, with some exceptions, as the recent epidemic at the Sloane Hospital for Women in New York City indicates. In the present state of our knowledge, anaerobic streptococcal puerperal infections will perhaps be best reduced by using some antiseptic preparation in the vagina at the beginning of and during labor. At the present time we recommend no particular preparation, but hope to determine by experience and experimental work what solution will prove most efficacious. We predict that this subject will be one that will command one of the most important investigations of the existing problems of modern obstetrics.

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OBSERVATIONS ON THE USE OF LOCAL ANESTHESIA IN GYNECOLOGIC OPERATIONS*

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LOCAL anesthesia has gradually come into prominence as means of avoiding the dangers of general anesthesia in minor operative surgery and in major surgery showing special complications that act as contraindications for general anesthesia. Its field of usefulness has been generally admitted for many years in dentistry, surgery of the extremities, lung surgery, and for the performance of cesarean section and episiotomy in obstetric surgery.

H. Braun[1] who is a pioneer in the field of local anesthesia suggests its use only in the minor gynecologic procedures about the external genitalia and in perineorraphies but he quotes Reclus as having done a vaginal hysterectomy for prolapse under local anesthesia. G. Labat[2] confines his recommendations of local anesthesia in gynecology to regional nerve block, and to the transsacral and spinal anesthesia. He uses the local infiltration anesthesia only in minor operations on the external genitalia. Farr[3] has used local anesthesia for general abdominal surgery with considerable success. Gellhorn[4] has been the first gynecologist to do extensive plastic work including vaginal hysterectomy under local anesthesia. His paper in 1927 stimulated considerable interest in the subject among gynecologists.

To be able to handle certain patients whose gynecologic condition is complicated by other pathology that contraindicates inhalation anesthesia, it becomes necessary to develop a method which will prove a safe substitute for general anesthesia without adding a second series of dangers equivalent to the first.

We have been gradually extending the use of local infiltration anesthesia in our gynecologic work. We have been surprised to find the extent to which this method can be applied to the field of operative gynecology.

Our earliest use of local anesthesia was in connection with episiotomy which we worked out in 1919 at the Lying-In Hospital. We next used it in doing perineorrhaphy and anterior colporrhaphy in selected cases. We then extended its use to dilatation of the cervix followed by curettage of the uterus. We next used it in the Watkins-Wertheim interposition operation, and then in the complete operation for procidentia including the anterior colporrhaphy, cervical amputation, perineorrhaphy and ventrofixation.

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The use of local infiltration in intraabdominal work, however, was limited to the occasional cesarean section which we have done under local anesthesia since 1920. Our early attempts to use the method in intraabdominal work were unsuccessful especially in those cases associated with inflammatory adhesions. We were unable to get sufficient relaxation or anesthesia to warrant its continued use until the last few months. This, we believe, to be due first to the fact that we used too little novocaine in our infiltration of the abdominal wall, and second because we had hesitated, for no good reason, to apply the infiltration method inside the abdomen for the relief of symptoms due to pulling on the broad ligaments or separating adherent adnexa and intestinal loops.

The purpose of the present investigation was:

1. To determine what gynecologic operations could be done under local infiltration anesthesia alone.
2. What benefit morphine and scopolamine would add as premedication.
3. What degree of shock, if any, attended major operations done under local anesthesia.
4. What effect the local infiltration might have on wound healing, and the immediate postoperative results.
5. How much interference might be expected with the identification of tissues and structures due to the distortion caused by the local injection.
6. What general postoperative complications might be expected such as vomiting, ileus, gas pains, shock, hemorrhage, peritonitis.
7. What complications of gynecologic conditions such as cardiac, renal, lung infections might be successfully handled by this method of anesthesia.
8. What methods of local infiltration are best adapted to various operations.

To begin with I wish to say that I hold no brief for the method of local anesthesia. We have no interest in sponsoring it in any way. We are interested in obtaining the answers to the foregoing questions, and submit herewith certain facts that we hope will be of some interest and will bring out a free discussion of the subject which will disclose the experience of this Society with regard to the procedure.

I must confess that the method was not especially indicated by complications in all of the cases that I am reporting, and that some of them might have been done as well under general anesthesia. The high percentage of successful anesthesias plus a desire to develop the technic in various types of operation suggested its use. No patient was operated upon, however, by this method without her consent, and with the understanding that we would give her general anesthesia if the pain got too severe.

One series of patients were operated upon without premedication except the routine one-fourth grain of morphine and $\frac{1}{150}$ of atropine one hour before the operation scheduled. A second group had the same thing one hour before operation and the scopolamine was repeated in a half hour. Another sixth of morphine was given if the patient seemed wakeful during the latter part of the operation, and this has become our routine for patients operated upon under local anesthesia.

With these points in mind we have been working for several years past to try to answer the previous questions. Some we seem to have fairly well settled, others will need considerably more critical study.

We have answered the first question in part by a list of the operations which we have already done, including dilatation and curettage, perineorrhaphy, anterior colporrhaphy, trachelorrhaphy, including denudation, Sturmdorf operation, amputation of cervix and advancement of bladder on the uterus and ventrofixation, vesicovaginal fistula repair, third degree lacerations of the perineum, ovarectomy, for large cysts (intraligamentary and extraligamentary), supracervical hysterectomy for fibroid uteri with adnexal pathology and dense adhesions, salpingoovarectomy, defundectomy and appendectomy, round ligament shortening (Gilliam, Baldy Webster), Watkins-Wertheim interposition operation, cesarean section (classical, low cervical and vaginal), cauterization of labial tumors and radium insertions, Bartholinectomy and vulvectomy, repair of wound following evisceration.

Certain general rules that have been thoroughly stressed previously by Farr will bear repeating, as we have found them to be absolutely correct by experience.

1. The patient must be made as comfortable as possible on the table before starting the operation.
2. Plenty of novocaine must be used for infiltration of the subcutaneous tissues, rectus sheath and peritoneum. In so doing there is no danger if the point of the needle is kept moving while injecting.
3. A tactful and skillful anesthetist who understands the procedure is of great assistance in allaying the fears of the nervous patient.
4. The greatest gentleness in all movements and in handling retractors, forceps, ligatures, etc.
5. Most of the operating must be done with the organs in situ. The elevation of structures, with the consequent traction on unanesthetized fields, is disastrous.

The material upon which these observations were based is more significant for the variety of operative procedures done than for the numbers of individual operations. However, we feel that enough has been done to determine the applicability of local anesthesia in these procedures. We have listed the operative procedures separately but it must be understood that more than one procedure usually was carried out during the operation. Thus, some of the patients had a dilatation and curettage, amputation of the cervix, anterior colporrhaphy, peri-

neorrhaphy and ventrofixation. There were in all 54 major procedures so designated because of the opening of the peritoneal cavity, and 88 minor procedures, in addition to 34 in which simply a dilatation and curettage was done.

MAJOR	
Supracervical panhysterectomies	11
Ovarian cysts	8
Ventrofixations	7
Appendectomies	3
Gilliam suspension	1
Low cervical cesarean sections	2
Classical cesarean sections	3
Vaginal cesarean section	1
Eviscerations	3
Interpositions	7
Ectopic pregnancies	4
Salpingectomies	2
Myomectomies	2
	54
MINOR	
Perineorrhaphies	20
Trachelorrhaphies	10
Anterior colporrhaphies	10
Episiotomies	30
Third degree lacerations	2
Vaginal fistula	1
Bartholinectomies	5
Cauterization of vulva	1
Vulvectomies	4
Cervical amputations	5
	88

These operations were done with no general anesthetic except in the case of one of the hysterectomies, in which because of very dense adhesions and marked adnexal pathology so much traction was necessary that vomiting was induced. This led to protrusion of some of the bowels through the abdominal wound which caused so much pain due to traction in the mesentery that it was necessary to relieve the pain by general anesthesia to complete the operation. There has been no mortality in this series and no evidence of acute novocaine poisoning.

TECHNIC

Episiotomy has best been done by direct injection of the line of incision without attempting to block the pudic nerve as it emerges under the ramus of the pubis near the tuberosity. We have delayed making the infiltration until the perineum is bulging and a portion of the scalp, larger than a dollar, is showing. Usually when the injection is made at this time and about five minutes allowed to elapse between the time of injection and incision, sufficient anesthesia is produced to allow for repair even if the remainder of the second stage and the third stage take as much as three-quarters of an hour. Occasionally a small amount of novocaine is injected subcutaneously during the repair if the tissues seem at all sensitive. The healing has not been disturbed in any way.

For the ordinary perineorrahaphy we use a combination of local infiltration and nerve block. With a fine needle we raise a wheal just above the tuberosity of the

ischium and through this with a longer needle we search for the inner border of the pubis just above the tuberosity. From here downward for about two inches we inject about 10 c.c. of novocaine on each side. From the same puncture we infiltrate locally another 10 c.c. in the region of the fourchet and lower half of the labium. We then infiltrate between the vagina and rectum underneath the posterior vaginal wall extending upward about two inches from the introitus. We allow the novocaine to act for about three minutes before opening the mucocutaneous junction. We find the separation of the vaginal and rectal walls is not painful, the levator muscles are easy to identify and the suture of the levator muscles and the urogenital septum is accomplished easily without pain, as is also the removal of the redundency of the vaginal mucosa.

For dilatation and curettage we place a tenaculum on the anterior lip of the cervix and inject about 7 c.c. of novocaine solution on each side of the cervix from one inch to two inches above the vaginal vault into the base of the broad ligament. The dilatation of the os in most cases is then easily accomplished without undue pain. We have found, however, on several occasions that the endometrium is sensitive as shown by the reaction of the patient when the dilators were introduced into the uterine cavity and especially when curettage was being done. However, the degree of pain is never sufficient to necessitate the addition of general anesthesia. In certain sensitive individuals it is necessary to infiltrate the perineum and the lower vagina to allow for the comfortable introduction of a weighted speculum.

For anterior colporrhaphy and the repair of cervix the infiltration is carried out the same as for dilatation and curettage. In addition to this the needle is introduced beneath the anterior vaginal wall between it and the bladder and the tissues thoroughly infiltrated. This helps to separate the vagina from the bladder. Infiltration under the bladder is made before separating the bladder from the uterus. Supplementary injections into the parametrium after it is exposed are made when necessary. These injections and manipulations can be easily carried out without any apparent pain to the patient. There is some obscuring of the planes of cleavage noted when a large amount of the solution is injected which may interfere some, although not seriously, with the identification of structures.

For the interposition operation the same technic is employed as for anterior colporrhaphy. In addition the vesicouterine fold is exposed behind the bladder and injected before being incised. The visceral peritoneum of the anterior uterine wall is infiltrated before being grasped by the Allis forceps to bring the fundus forward. The traction necessary in this step of the operation nearly always causes some pain complaint. By injecting the uterine end of the round ligaments and the upper part of the broad ligaments the tubal section can be carried out for sterilization when necessary. The anterior vaginal wall covers the fundus without difficulty.

For opening the abdomen the following steps have been used: Thorough infiltration of the subcutaneous tissues for a distance of about three inches on each side of the midline. Particular attention has to be paid to the lower three inches of the incision near the pubis as it is much harder to get a good block here. The rectus sheath is then thoroughly infiltrated on each side by several injections made by puncturing the sheath along the wound and injecting about 3 c.c. of solution at each point. The sheath is then opened and the muscles separated by sharp dissection if necessary. The peritoneum is next thoroughly infiltrated in the midline and also a few inches on each side, special attention being given to that portion of the peritoneum which will come in contact with the mechanical retractor when the latter is in place. We have recently supplemented these injections by injecting subperitoneally from the abdominal side especially in the region when the retractors are to be spread. The bowels are gently crowded into the upper abdomen by wet lap pads and the pelvic viscera are carefully inspected or gently palpated to determine the number and extent of adhesions present. The fundus of the uterus is infiltrated if

it is desired to grasp it with a tenaculum. It can then be raised gently, and the broad, infundibulopelvic and round ligaments thoroughly infiltrated using a fine needle. The cervical region anteriorly and posteriorly can then be injected after which considerable traction can be made on the uterus with comparatively little pain to the patient. Ventrofixation can now be easily carried out. Baldy-Webster or Gilliam suspension, salpingectomy, defundectomy, ovarectomy can be equally well done. When there are adhesions between the uterus or adnexa and the broad ligament or pelvic walls it becomes necessary to infiltrate the areas of attachment, and separate by sharp dissection with the minimum of traction.

Oophorectomy for a large cyst has been easily accomplished in those cases in which the cyst was pedunculated and not too adherent. The abdomen was opened in the usual way, the cyst partially emptied of its contents by trocar, then gently lifted out of the abdomen and the pedicle, thoroughly infiltrated and clamped. The cyst was then removed and the pedicle ligated. For those cases complicated by adherent loops of bowels, infiltration of the adhesions and sharp dissection has resulted in freeing these adhesions with practically no discomfort. Slightly more difficulty has been encountered with the intraligamentary type of cyst. In these cases, however, if the broad ligament is carefully infiltrated it is surprising how much dissection can be carried out with the minimum of pain if one infiltrates as he proceeds and avoids undue traction.

For exposing and removing the appendix through a midline incision we have found it best to use the Jackson retractors. We lift up the cecum gently as far as its normal mobility will permit and infiltrate the mesentery of the appendix before clamping and tying the same. We have not found it necessary to inject the peritoneum of the cecum to insert the purse-string suture. The excision and inversion of the stump are easily done without causing pain.

We have had two opportunities to use the local infiltration in the repair of evisceration wounds neither of which occurred following primary laparotomy under local anesthesia. Infiltrating on each side of the wounds subcutaneously and into the peritoneum close to the edges of the wound has been sufficient to allow for repair without general anesthesia. The difficulty here has been the keeping of the bowels in the abdomen while approximating the edge of the peritoneum. Wound healing occurred uneventfully in both cases.

DIFFICULTIES ENCOUNTERED

These may be divided into psychical and physical. Under the former we may place those patients who approach the operation in a state of terror at the thought of an operation without general anesthesia or in whom the premedication is withheld or does not have the proper sedative action. These patients react violently to the preliminary hypodermic injections and to every sensation of pressure whether or not they feel pain. If the work to be done in the abdomen is at all extensive, these patients had best be given a general anesthetic. Failure of the anesthetist to properly reassure and distract the attention of the patient may lead to failure of the method. The surgeon and his assistants must constantly realize the limits of the field of anesthesia and that everything outside the blocked area must not be touched. That all movements must be made gently and deliberately. The method is time-consuming and demands the greatest amount of pa-

tience. Procedures that can ordinarily be carried out easily and swiftly take time and are often difficult to accomplish under the imposed restrictions.

The physical difficulties are numerous, but as a rule not insurmountable. We have found that exposure as a rule is not as easy to obtain due to two factors: First the abdominal retractor cannot be spread quite so widely as under general anesthesia, and second the bowel cannot be held back in the upper abdomen by laparotomy pads quite so well. Much of the work has to be carried on deep in the abdomen, especially where there are many adhesions, to avoid the discomfort due to traction on the peritoneum of the culdesac or side walls of the pelvis. Large fibroids especially on the anterior wall interfering with access to the broad and infundibulopelvic ligaments increase the difficulty of injecting these structures. Marked adnexal pathology complicating large fibroids especially with omental and intestinal adhesions have offered insurmountable difficulties in some cases. Access to the adherent adnexa to permit of infiltration of the area of attachment has given trouble at times. Whenever possible, adhesions have been carefully divided by sharp dissection under the eye. Bleeding in a given case may interfere with this procedure. When bleeding occurs either from raw surfaces or from a vessel that has escaped from a suture or forceps it is not so easily controlled as under general anesthesia since hot pack, pressure, forceful retraction and clamping are limited in their applicability. If great caution is not observed vomiting and retching will occur which frequently results in so much pain that general anesthesia has to be resorted to. However, this can be accomplished with a minimum of gas and even this can be dispensed with before the end of the operation in many cases.

It is estimated that it takes about one-fourth to one-half longer to do the work under local anesthesia. Plastic work is also slower because of the necessity of supplementary injections from time to time, and the care with which we proceed to insure staying within the anesthetized area. Idiosyncrasies to the premedication or to novocaine are a potential source of danger although none of our patients have shown this complication. We incise the abdominal wall soon after injection and hence much of the injected fluid runs out. The greatest danger is that a considerable amount of the fluid might be injected intravenously. This can be entirely avoided if one keeps the point of the needle moving while injecting. We have had trouble with wound healing in two cases. One a third degree tear which had previously refused to heal following attempted repair under general anesthesia. Our secondary repair attempt under local infiltration resulted in a healing of the muscle sutures with good functional result but the skin and urogenital septum did not heal. The edges were freshened under general anesthesia and closed again with silkworm-gut and

again failed to heal. In another case we noted a cellulitis about 5 or 6 cm. from the wound margin and extending around into the flank. The wound, however, did not break down in this case even though the patient produced a severe second degree burn by the use of a hot water bottle.

ADVANTAGES OF THE METHOD

There is apparently no danger to the method except that of novocaine poisoning in case a considerable amount of the solution should be injected into the blood stream, or more than 300 c.c. be necessary for the infiltration. No evidence of a toxic reaction occurred in our cases.

There is no shock to those patients as evidenced by fall in blood pressure, rapid pulse and the usual evidences of this complication.

There is no reason to hurry during the operation because of the possible toxic effect of the anesthetic on the general condition of the patient.

There is much less afterpain, vomiting, retching, and the toxic effect of the general anesthetics on the parenchymatous organs as the liver and kidney is entirely eliminated reducing postoperation acidosis.

Fluids by mouth can be tolerated earlier and bowel peristalsis comes back quicker than in similar operations than when done under general anesthesia.

The ever-present danger of bronchopneumonia due either to the irritation of the anesthetic agent itself or to aspiration of vomited material is eliminated. It is of course well known that this complication may follow local anesthesias.

The conscious patient can cooperate better in the postoperative management and can give valuable information regarding subjective symptoms in case of complications. This advantage is somewhat offset by the fact that some of these patients remain drowsy from the premedication about as long as if they had had ether and much longer than patients who have had gas or ethylene. There is no danger of explosion or sudden death from asphyxia as may follow ethylene or nitrous oxide.

The reaction of the patient to the whole procedure is of interest. Those not having premedication are quite apprehensive and nervous about the procedure. They react less favorably to the preliminary infiltration and complain more during operation and remember the operation as an ordeal. The cases having proper premedication, however, stand the infiltration and operation much better, and even when they complain at times have no unpleasant memories of the operation. Those who do complain of the operation refer not so much of the actual pain as of hearing the instruments and the consciousness of the whole procedure.

The following case reports illustrate some of the points which have been made in the preceding pages.

CASE 1.—A thirty-seven-year-old para vii, with a severe nephritic toxemia, a bronchial asthma, and a six months' pregnancy. Blood pressure 260/150. A vaginal cesarean section was done. During the operation the blood pressure dropped from 260 to 200, the pulse from 152 to 140 and the respirations from 32 to 20. She slept throughout the operation which was rather difficult because the cervix could not be brought down to the introitus. There was no evidence of shock postoperatively, and she made an uneventful recovery. The operating time was sixty-three minutes.

CASE 2.—A thirty-four-year-old white woman with a large ovarian cyst. The tumor was tapped before removal and 2060 c.c. of fluid removed. During the removal the systolic pressure fell from 120 to 100 and the diastolic pressure from 80 to 70. The pulse fell from 80 to 70 and then rose up to 100 while the cyst was being removed, and the operation ended in forty minutes with a systolic pressure of 100, diastolic of 70 and a pulse of 90. The patient was cooperative only showing a brief period of moving and talking.

CASE 3.—A supracervical panhysterectomy was done. Operating time one hour and fifteen minutes. The systolic pressure dropped from 145 to 115 and returned to 130. The diastolic pressure remained 70 throughout. The pulse was 110 at the start of the operation and steadily reduced to 90. Respirations decreased from 32 to 26. Vomited twice and noisy at times.

CASE 4.—A twenty-eight-year-old white woman with a marked mitral stenosis and beginning pulmonary edema and a systolic blood pressure of 145 was in the hospital for two months because of cardiac decompensation. Classical cesarean section was done near term in Fowler's position because of dyspnea. Operating time was fifty-two minutes. Operation was started with systolic pressure of 145 and ended with systolic pressure of 110 and the diastolic pressure ranged from 100 down to 70. The pulse varied from 110 at the start of the operation to 72 at the end. She complained of some pain on delivery of baby and on sponging the lower angle of the wound. One-fourth grain of morphine was given hypodermically as soon as the baby was delivered. Convalescence was uneventful.

CASE 5.—A forty-eight-year-old white woman had a supracervical panhysterectomy for fibroid uterus. The operating time was one hour and thirty-five minutes. The blood pressure was 138/90 at the start of the operation and 124/80 at the end. The pulse was 110 at the beginning of operation and 88 at the finish. There was some pain on delivery of the tumor and some irrational talking throughout but practically no memory of pain the next day. Recovery was uneventful.

CONCLUSIONS

1. Nearly every gynecologic operation can be done under local anesthesia reenforced by scopolamine and morphine.

2. It is not the anesthesia of choice in uncomplicated cases because of the difficulties mentioned above.

3. It is the method of choice in certain carefully selected complicated cases because of the advantages mentioned above.

4. The operator must be prepared to spend more time and patience in this type of operating and deftness and gentleness in handling tissues are of paramount importance.

5. Major abdominal operative procedures should not be attempted by the unskilled surgeon since complications may occur that will try the skill of an experienced surgeon.

6. Facilities for switching to general anesthesia should be available as well as the assistance of a trained anesthetist who cooperates in the management.

7. A combination of nerve block and local infiltration is advisable in most of the work, especially the abdominal work.

8. Premedication with scopolamine and morphine is a very valuable adjunct.

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30 North Michigan Avenue.

(For discussion, see page 427.)

Fruhinsholz, A.: Operative Indications in the Presence of Lutein Cysts Associated with Hydatid Mole. Gynéc. et Obst. **18:** 193, 1928.

The author reports two cases bearing on the disputed question of the pathogenic significance of lutein cysts developed coincident with hydatidiform mole. His first patient was one in whom large cysts, one of them the size of a fetal head, were present coincident with a hydatid mole. These persisted for several weeks together with signs of mild infection and subinvolution and regressed and disappeared finally after a curettage. A normal pregnancy followed. A second patient, with a uterus of size of about three months, showed two ovarian cysts approximately the size of small oranges. Débris from the uterus gave the diagnosis of hydatidiform mole. Two weeks later a curettage was done and there followed a definite reduction in the size of the cysts. Two months later the patient was menstruating normally and the ovaries had returned to approximately normal size. The author concludes that it is not necessary to operate from above for hydatidiform mole associated with large ovarian cysts, not even when larger cysts persist as long as two and a half months after the expulsion of a mole though there might be a suspicious uterine discharge. These findings may simply indicate a mild infection with subinvolution. In the latter case a curettage may effect uterine regression with secondary ovarian involution. The clinical finding of bilateral ovarian cysts with a uterus enlarged in size together with menstrual troubles should suggest the possibility of the existence of a mole even in the absence of microscopic findings.

Goodrich C. Schauffler.

Bauer, A. W.: The Influence of Acid Diet and Akali Diet on the Self-cleansing of the Vagina. Med. Klin. **39:** 1506, 1929.

The author succeeded in curing leucorrheal discharge by prescribing raw foods and foods rich in vitamins such as fruit, nuts, salad, vegetables, raw milk, and sauer kraut. He also cured nonspecific vaginal discharges in children by the administration of vigantol. Before prescribing the special diets for his patients, Bauer had lived on a vitamin-rich, meat-poor, salt-poor and alkali-rich diet, and had felt better than for many years.

J. P. Greenhill.

THE VARIABILITY OF MENSTRUAL RHYTHM AND CHARACTER

By Samuel H. Geist, A.B., M.D., F.A.C.S., New York, N. Y.

IT HAS been more or less accepted that the normal menstrual rhythm is a monthly cycle with very little variation in time interval, duration, and amount. Alterations from the set cycle have been accepted as indicating a pathologic condition. The careful histologic studies of Hitschmann and Adler have shown that the uterine mucous membrane undergoes definite cyclic changes, and in more recent times Schroeder, Meyer and others have correlated these uterine stages with corresponding cyclic processes in the ovary. More recently Frank and his coworkers have shown that in the blood there is a definite cycle paralleling the ovarian and uterine one. All of these correlated cycles, ovarian, blood, and uterine, may show variations that are classified as normal. It has been demonstrated that approximately between 8 and 14 days after the last period the mature follicle ruptures, to be followed in a certain specific time by the appearance of the menses, provided the ovum has not been fertilized. While we have realized that individual variations in the menstrual periods take place, and that periods with a time interval of 24 to 32 days have been considered normal, we have accepted the fact that the type for each individual was more or less fixed. Sanes (Am. J. Obst. Diseases of Women and Children, 1916, Vol. 73, p. 93) has studied this problem of periodicity and states that 77 per cent of women have regular periods. If there was an irregularity noticed, it was of one or two days either way. He has also noticed that even if patients have menstruated as long as 4 days regularly, a temporary period of amenorrhea may supervene. He has also noted some irregularity in duration, but finds 3 days the most common type. He mentions the fact that during a period, one or two days may occur without any bloody discharge followed by one or two additional menstrual days. The common type he finds is the 28 day period with a duration of 3 days. When there is an irregularity the tendency is for the period to be prolonged, and he concludes that 75 per cent of women menstruate, as he terms it, regularly.

I have made a careful study of 200 cases, ascertaining with great detail the exact days of each menstrual period for the entire year. These cases were not actually ill, nor were they suffering from uterine or ovarian neoplasms or disease. They represented women who were under observation for such conditions as cystorectocele or retroversion; women without gynecologic disease, who simply reported for a check-up on the menstrual type; a group of postoperative cases whose clinical histories

before operation were apparently normal as far as gynecologic disease was concerned; and a small group of female workers without any physical disturbance.

VARIATIONS IN INTERVAL

The most striking find was the fact that the menstrual period did not recur regularly on any specific day. In other words, the patient who stated that her period always occurs on a specific day in the month, when closely questioned and when required to keep an accurate written report, was noted to be in error. In a very few instances the periods occurred on the twenty-eighth day for 9 of the 12 months. In most instances, however, there were variations in the appearance of the first menstrual discharge that varied from 5 days before the accepted time to 10 days after, and this variation occurred almost as frequently as would the so-called normal cycle. In 12 instances periods were skipped for an entire month with no definite reason except in 2 cases where psychic trauma, in one case, death in the family, in another, an automobile accident, may have contributed. The following periods were normal in character and duration. In neither of these two cases was it possible to obtain tissue for examination, so that the possibility of an early abortion cannot definitely be excluded, but the history makes it seem very unlikely. In two instances two monthly periods were skipped in two separate individuals. In both of these cases the return of the menses, after the two-month period of amenorrhea, was normal in character and duration. A small group gave a history, and their records bore this out, of periods whose onset was every 18 to 23 days with one- or two-day variations either way. In other cases for 6 or 7 months of the year the onset of the period was marked by extreme irregularity, varying from 28 to 40 days, and then suddenly for the rest of the year a so-called normal 28 day cycle.

VARIATIONS IN DURATION

In addition to the marked variations in the menstrual interval, it was also noticed that there was a distinct, though not so marked, variation in the duration of the flow. In 115 of the 200 cases the periods for the entire year lasted exactly 4 days; in 50 for 5 days; in 18 for 6 days; in 9 for 7 days; in 3 for 8 days; and in 4 for 12 hours. In a number of cases where the period lasted 4 days, a single period during the year would last but for 3 days or occasionally extend to 5 days. In the cases that normally lasted 5 days there were several instances where the duration was only 4 days for one, two, or even three periods in the year, and an occasional period that lasted 6 days. This same variation was noted in those cases where 6 days was the accepted normal duration. It was observed in addition that not only did the duration of the period vary from one-half day to 8 days, this variation being grouped as normal, but that in the same individual the periods might present slightly dif-

ferent aspects not only as previously mentioned as to interval, but also as to duration. In several instances those women who menstruated but a half day for nine periods, would menstruate sometimes for 24 hours and occasionally for only 1 hour for the other 3 periods. Those women who had very short periods showed little variation in the type, and each recurrent menses would be approximately of the same duration and same character as the preceding one—a variation of one day one way or the other occasionally being observed. Those that were classed in the normal group of 4 to 5 days likewise showed only slight variations either in onset, duration, or character, usually 24 hours' prolongation or curtailment being the greatest variation.

VARIATIONS IN MODE OF ONSET AND INTENSITY

The mode of onset and intensity of a period also presented differences. In those women whose periods were 4 days, the usual history obtained was that the period began with slight spotting for 24 hours, and then became moderately profuse for 24 to 36 hours with a gradual cessation. The spotting stage necessitated only one napkin for 24 hours, and that merely as a precautionary measure; during the more profuse stage 4 to 8 napkins per day were necessary, this being controlled by the personal habits of the patient. In those periods lasting over 4 days the flow would also begin with a slight staining for 24 hours, the second and third day of the period being more profuse, with a gradual tapering off for the next few days. In those women whose periods were of longer duration than 4 days the flow was usually described as very profuse for at least 3 of the days of menstruation, the women often being confined to home or bed for 24 or 48 hours. This period of confinement was the second or third twenty-four hours of the period. Usually in those women whose periods were of long duration the onset would be described as a brownish discharge for 2 or 3 days, with a profuse and often painful flow for the next 2 or 3 days. The pain, too, at times was sufficient to confine the patient to bed. After the subsidence of the profuse flow another 72 hours of gradual diminishing discharge was noted.

The character of the onset also varied irrespective of the interval or duration. In most instances the onset of the period was described as dark brownish stains. In a small number of cases it was noted to be light blood-streaked mucus, and in another group a bright red spotting.

The character then changed to the dark unclotted thick blood which persisted for the duration of the heavy flow and gradually subsided until its final disappearance. In a few instances where this was the accepted character of the flow, it was noted that the period stopped abruptly instead of being a gradual cessation. When this occurred the total duration of that period was observed to be from 24 to 48 hours less than the accepted normal for that individual. In many

instances the onset was described as a moderate staining for 2 days with complete cessation for one day, then the sudden appearance of more or less profuse bleeding persisting for 2 or 3 days, and a gradual disappearance. Again in a number of women the mode of cessation varied. In some there was a gradual diminution of the flow to complete disappearance, in others an abrupt stoppage at what seemed the height of the flow, and in a third group the flow would apparently cease, to reappear after 24 or 48 hours. In this latter type the reappearance of the discharge, which was usually slight, added a day or two to what the women considered their normal duration. This latter type was often accounted for by the patient as due to some physical exertion or to the taking of a bath. The character of the flow we have seen varies somewhat in individuals and in individual periods for the same woman.

Clots were described as being passed in 28 cases, in 20 of them without pain, in 4 with slight pain, and in 4 with great pain. The histologic examination of these clots showed blood leucocytes, desquamated vaginal epithelium, and varied sized fragments of uterine mucosa. The size of these fragments bore no relation to the degree of pain.

It would seem from these observations that there is a wide range of variability in the actual concept of the normal menstrual function. These variations may be dependent on different factors. The following deductions are, however, purely hypothetical.

1. A difference in the rate of production of the ovarian hormone, or hormones.
2. A difference in the concentration of the hormones.
3. A variation in the rate of excretion of the hormones.
4. The variable susceptibility of the individual to the hormones; or
5. A variation in the synergistic or antagonistic activity of the hormones.

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Herrman, E.: Rupture of Ovarian Tumors. Wien. klin. Wchnschr. 42: 1350, 1929.

This is a case report of rupture of a dermoid ovarian cyst following a fall in a 57-year-old women. The cyst contents localized not in the pelvis but about the umbilicus. The literature on the subject is reviewed.

Frank Spielman.

CONGENITAL DEFECTS OF THE DIAPHRAGM WITH RELATION TO ASPHYXIA NEONATORUM

Report of Two Cases

By Carl S. Harper, M.D.,* and O. N. Andersen, M.D.,
Madison, Wis.

(From Jackson Clinic, Madison, Wis.)

IN STANDARD textbooks of obstetrics, there is seldom any reference to congenital defects of the diaphragm as a cause of asphyxia with atelectasis pulmonum in the newborn. Numerous isolated case reports may be found in the literature, most of them erroneously labelled "congenital diaphragmatic hernia."

A study of the findings at autopsy in all of the cases which we reviewed shows that they are not a true herniation through the diaphragm, but a partial or complete absence of one or both sides of the diaphragm with the hiatus pleuroperitonealis remaining and with variable proportions of the normal abdominal contents occupying the chest cavity. Associated with this is a corresponding displacement of the thoracic structures. The heart and lungs are displaced to the side opposite the bulk of the invading abdominal organs. There is also a marked lack of development of one or both lungs, a significant point with regard to any proposed surgical treatment.

LeWald, in an excellent article on congenital absence of the left half of the diaphragm, differentiates this condition from eventration of the diaphragm, thoracic stomach, and diaphragmatic hernia. Included in his article is a brief description by Hume of the development of the diaphragm.

The first case to come under the personal observation of one of the authors (C. S. H.) was at the Brooklyn Hospital, Brooklyn, New York. The mother appeared normal in every respect and for a primipara had an unusually easy, spontaneous delivery. The child breathed and cried promptly. No particular effort at resuscitation was necessary, and no abnormal condition was suspected. The position of the apex beat was not noted at the time. The second day after delivery there were several mild cyanotic attacks. Consultation with the physicians of the pediatric service elicited no definite diagnosis or suggestion with regard to treatment. On the third day, the cyanotic attacks increased in frequency and severity and resulted in death. Postmortem examination revealed a partial absence of the posterolateral portion of the left side of the diaphragm; the chest cavity was occupied by all of the abdominal contents except the liver, stomach, spleen, a few inches of the upper small bowel and the descending portion of the large bowel.

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Both lungs were decidedly lacking in development, particularly the left one, which was completely atelectatic. There was moderate air content in the right lung. The heart was displaced to the right of the midline. The posterior parietal peritoneum was continuous with the parietal pleura and the posterior margin of the narrow left diaphragm was smooth. The real condition was not even considered prior to death; the diagnosis was made at autopsy. Both the physicians of the

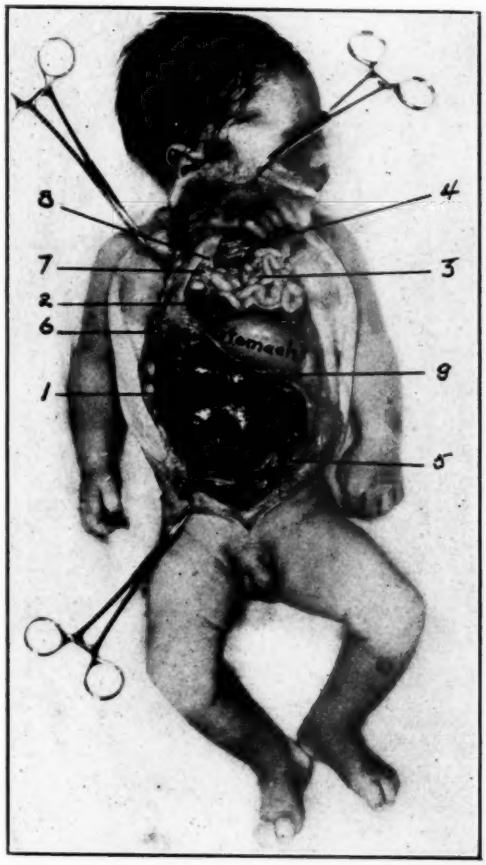

Fig. 1.—*1*, liver; *2*, spleen; *3*, small intestine; *4*, large intestine; *5*, sigmoid; *6*, heart; *7*, right lung; *8*, left lung; *9*, anterior border diaphragm.

pediatric service and the baby's parents were of the opinion that the infant had been injured in some way during the delivery. This impression could not have been dispelled without postmortem examination. (Figs. 1, 2, 3.)

Case 2.—This mother was a secundipara. Her first child, aged seven years, was in good health at the time of birth of the second baby. Labor was uneventful, easy and spontaneous. The infant was normal in general appearance and weighed eight pounds. Resuscitation was slow, but

the heart tones were of good quality. The apex beat was located in the midline. The appearance and behavior of the baby were very much the same as of one with a moderate degree of morphine-scopolamine narcosis, and as the mother had received one-sixth of a grain of morphine and one two-hundredth of scopolamine about three hours prior to delivery, the delay in resuscitation was attributed to this and very little attention given to the position of the apex beat at the moment. In about ten

Fig. 2.—*1*, Persistent hiatus pleuroperitonealis; 2, rounded posterior edge of diaphragm brought forward.

minutes fairly regular respirations were established, the baby's color improved, but the respirations continued to be abdominal in type, with very slight expansion of the chest. After having cleared the air passages, gentle mouth to mouth insufflation had been tried with no benefit. Oxygen was continuously supplied from the tank and seemed to be the most effective means of maintaining the color.

The child was taken to the nursery, where administration of oxygen was continued, and for about an hour the color remained fairly good.

Then severe cyanotic spells were noted, occurring at intervals of fifteen minutes. Each time they were relieved by administering oxygen for a few minutes. After five hours the cyanosis became persistent and respirations were irregular and at long intervals. The heart action remained good, but respirations finally ceased about seven hours after delivery. During this time it was noted that the apex beat and heart sounds were well over to the right of the midline, that the chest was

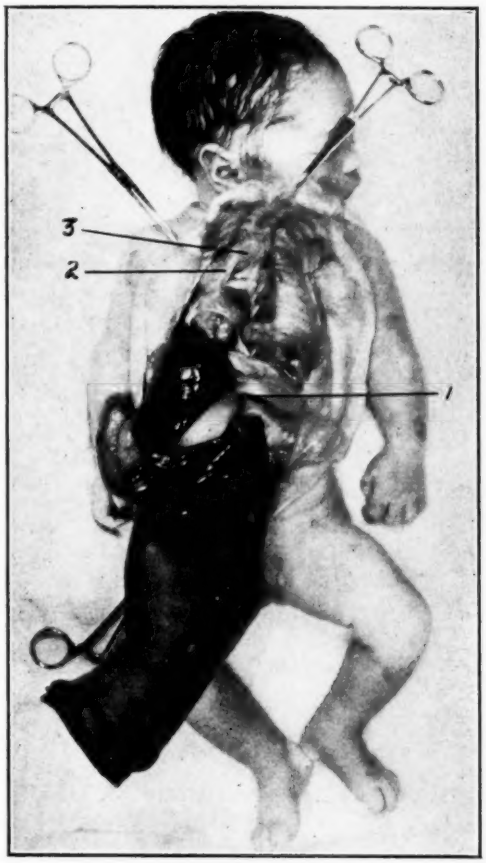

Fig. 3.—Thorax with abdominal contents restored to peritoneal cavity: *1*, hiatus; *2*, right lung; *3*, left lung.

quite tympanitic over the left side, less so over the right side, and that the breath sounds were harsh and transmitted loudly throughout the entire chest. Pediatric consultation had confirmed our physical findings. The possibility of a congenital diaphragmatic defect was considered, largely because of experience with the first case described, but the grave condition of the baby during its entire period of life precluded any x-ray examination.

Postmortem examination revealed a condition entirely incompatible with continued existence. The peritoneal cavity contained nothing but a large liver, the first portion of the stomach, and the length of large bowel necessary to reach the anus. The posterolateral portion of the diaphragm was incomplete, with persistence of the hiatus pleuroperitonealis leaving an opening 3 x 2 cm. The parietal peritoneum was continuous with the parietal pleura and the posterior margin of the incomplete band of diaphragm was smooth.

The anterior chest wall was removed and the colon, entire small bowel, stomach and spleen were found to occupy about four-fifths of the thoracic cavity. The small bowel occupied both apices of the chest. The left lung was about .5 x 1 x 2 cm. and completely collapsed. The right lung was about twice as large and contained air. Both were just above the heart and crowded against the posterior thoracic wall. The heart appeared normal in size and structure. The thymus was normal in size. With gentle traction the abdominal contents could very readily be replaced in the abdomen in their normal arrangement.

Both of these cases represent the same type of congenital defect in the formation of the diaphragm, differing chiefly in the amount of abdominal content found in the thorax. The symptoms and length of life are in proportion to the degree of abnormality.

The case reports studied in the literature are of a similar nature, varying only in the extent of the defect. They may be briefly summarized as follows:

Fernandez, of Buenos Aires, reports two cases. One infant survived only thirty minutes. The other infant at the age of three months, showed marked cyanosis during the nursing period, a significant feature with regard to methods of resuscitation which may be wisely employed. Diagnosis was determined by roentgenograms in both cases. Reports of postmortem examinations are not given in detail.

Dunne reports one stillbirth. The diagnosis was established at postmortem examination. Autopsies are urged on all stillbirths in order to avoid unjust criticism of the management of labor.

Williams also reports a stillbirth with futile attempts at resuscitation. In this infant the right lobe of the liver and the gall bladder as well as the other abdominal organs were in the thorax, the diaphragm defective on both sides, and the lungs very small.

Waldron reports "an additional case to the many now in the literature" in which the infant survived fifteen minutes. There was marked lack of development of the lungs and extrusion of all of the abdominal contents with the exception of the liver. The possibility of surgery was considered but not attempted in this instance. Connors and Robinson report the case of a young woman as congenital diaphragmatic hernia. A series of 245 cases of diaphragmatic hernia in adults was reported by Leichtenstern. In the cases noted, very few were congenital, the majority were traumatic in origin. In view of the high fetal mortality from this condition, one would expect to see very few adult cases of congenital origin.

Lull reports a case with marked congenital defect of each side of the diaphragm, resulting in almost a complete absence of that structure. No respirations were established, although the heart beat for fifty-five minutes. The lungs were very small and undeveloped. Methods of resuscitation used in this infant were "the

administration of carbon dioxide, with alpha-lobeline and atropine injections, which were of no avail. Artificial respirations were instituted and after a short time the more vigorous methods of resuscitation were resorted to."

The condition under discussion is, perhaps, a more common cause of asphyxia neonatorum than one is led to believe by the relative infrequency of case reports. Many more such reports probably could be added to the literature if physicians would more frequently insist on

Fig. 4.—Injection of opaque media through the rectum (postmortem).

postmortem examinations, especially in cases in which the cause of death is not obvious from the physical examination. For diagnosis prior to death, the first essential is to have the condition in mind in all cases of persistent or recurrent asphyxia, especially when the delivery has been accomplished in such a manner that there is no good reason for suspecting trauma. Displacement of the apex beat to an unusual position, either right or left, is very suggestive of the condition, especially when accompanied by atelectasis. If the child should survive for a period of several days, x-ray investigation would serve to confirm the diagnosis.

When permission for autopsy is refused, injection of the gastrointestinal tract from both ends with one of the usual opaque media, followed by roentgenograms, would serve to establish the presence of thoracic invasion by the bowel and to clear the physician from the imputation of being the responsible factor in the death. In our most recent case the house obstetrician and, no doubt, many of the nursing staff, firmly believed that the morphine and scopolamine were the chief factors in the asphyxia. (Figs. 4, 5.)

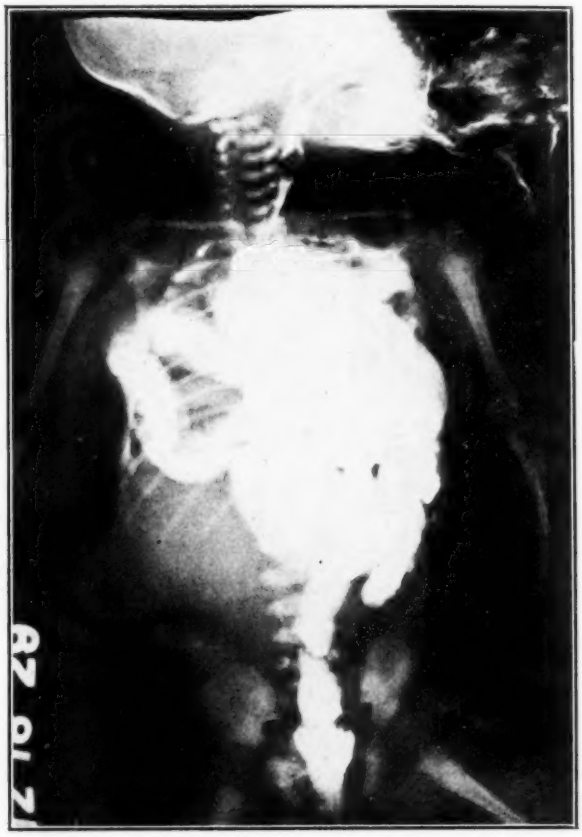

Fig. 5.—Injection of opaque media through the duodenal tube (postmortem).

Attempts at resuscitation should always be gentle. Some form of intratracheal insufflation under controlled pressure would be most effective. Mouth to mouth insufflation is the most disastrous type to employ as it usually inflates the stomach, thereby increasing the severity of the asphyxia.

No case records could be found in which surgical treatment had been carried out in the newborn, although several of the authors consider the advisability of early restoration of the bowel to the abdominal cavity

and closure of the hiatus pleuroperitonealis. In our second case it would have been feasible from the mechanical standpoint to restore the bowel to the peritoneal cavity and, perhaps, close the hiatus, but in view of the marked lack of development of the lungs, it is felt that any such procedure would have been without value. Therefore, unless the child shows ability to survive and at least hold its own for several weeks, as in the case reported by Fernandez, in which the infant developed cyanosis at the nursing period, surgery is contraindicated. The immediate effect of surgery, unavoidably associated with pneumothorax, in an asphyxiated child would be disastrous.

CONCLUSIONS

1. Congenital diaphragmatic hernia is a misnomer for the condition caused by defective development of the diaphragm in which the hiatus pleuroperitonealis persists, and the abdominal contents invade the thorax.

2. In persistent asphyxia neonatorum, with displacement of the heart, atelectasis due to a congenital diaphragmatic defect is very probable.

3. Controlled intratracheal insufflation is the method of choice in resuscitation, and mouth to mouth insufflation should be avoided.

4. Diagnosis of the condition should be established by x-ray or by autopsy.

5. Surgery is contraindicated as an immediate procedure.

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Baltzer, H.: Adenomyoma of the Uterus. Arch. f. Gynäk. **138**: 278, 1929.

The author details an unusual type of adenomyoma which apparently has not been previously described in the literature. The tissue was removed from a forty-seven-year-old nullipara who was first curetted because of menorrhagia and metrorrhagia. The uterine scrapings were characteristic of uterine adenomyoma but were also suspicious as being carcinomatous. An abdominal hysterectomy was performed and the uterus found to contain, besides a moderate sized intramural fibroid, a pure adenomyoma growing in intimate contact with the fibroid. This adenomyoma was sharply circumscribed and contained absolutely no stroma. It did, however, show evidences in one or two areas of carcinomatous changes in the cells.

Ralph A. Reis.

IRREGULARITIES OF THE FETAL HEART*

A Phonocardiographic Study of the Fetal Heart Sounds from the Fifth to Eighth Months of Pregnancy

By Albert S. Hyman, M.D., F.A.C.P., New York City

(Director, Witkin Foundation for the Study and Prevention of Heart Disease, Beth David Hospital)

STUDIES of the fetal heart sounds have been made for at least one hundred years; Kennedy in 1830 described certain sounds and murmurs heard over the pregnant uterus which were not synchronous with the maternal heartbeat. Interest in the examination of the fetal heart sounds has never failed to occupy the attention of the clinician in the century which has followed and from time to time, as new methods have been developed for the investigation of the fetal heart, obstetricians have eagerly seized these procedures.

Amplification of the heart sounds and their graphic registration has made possible further study in regard to the heart and its activities. The past decade has seen a tremendous accumulation of information based upon the electrodynamic manifestations of the heartbeat; the electrocardiograph and the polygraph have become instruments which can reveal the smallest changes from normal. Amplification of the heart sounds now carries forward the possibility of examining the heart under conditions not made available to the electrocardiograph. This is especially true in regard to the study of the fetal heart.

Phonocardiograms, which are the graphic records produced by amplification of the heart sounds, were obtained from the fetus in 1926 by Sampson. He was able to demonstrate that the fetal heart sounds could be easily amplified and recorded graphically for subsequent study. Many fetal heart sounds which were heard with difficulty by the various types of stethoscopes can be readily photographed. Congenital murmurs and anomalous cardiovascular changes can be diagnosed before birth by this method. Irregularities of the fetal heart, however, have not been studied by this method and an attempt has been made to present graphically to the obstetrician the various types of irregularities which may be discovered. This paper is concerned with the more common types of fetal arrhythmias.

FREQUENCY OF FETAL HEART IRREGULARITIES

Irregularities of the fetal heart, especially from the fifth to eighth months, are apparently not uncommon. The available literature does

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not, however, record its frequency. A questionnaire sent to 100 obstetricians in the United States whose collective experience probably represented the results of more than 100,000 prenatal examinations, showed that there is apparently no agreement in regard to the frequency and occurrence of the fetal arrhythmias. About one-third of the obstetricians had never heard changes in the rhythm of the fetal heart; one-half of those that answered said that it was very infrequent. The remainder, on the other hand, reported that irregularities of the fetal heart were very common, estimates running as high as from 25 to 33 per cent of all cases examined prenatally.

The reason for the extreme divergence of opinion in men of equally wide experience is probably due to the difficulties frequently encountered in the examination of the fetal heart; most obstetricians are content to establish the mere presence of the fetal heart and do not carry their examination of it further than a few seconds of observation. Other aspects of the prenatal examination naturally are of more interest to them so that detailed and specific information about the character of the fetal heart is not ordinarily made.

In a rather incomplete survey made of the cases coming to the Prenatal Clinics of the Beth David Hospital Dispensary over a period of about one year, irregularities of the fetal heart were discovered in about 9.2 per cent. While this figure cannot be taken as representing the true incidence of fetal arrhythmias, it is suggestive in indicating that the condition may not be an uncommon one. Subsequent study and collective comparison of figures obtained from many such clinics throughout the country will be necessary before any degree of accuracy can be secured in estimating the true frequency of the fetal arrhythmias.

THE FETAL PHONOCARDIOGRAPH AND ITS CLINICAL APPLICATION

Fetal phonocardiographic tracings are photographic records of the fetal heart sounds after they have been converted into electromagnetic waves by radio amplification. The sounds made by the heart in utero are picked up by specially constructed stethoscopes and led to microphones; here the sound waves are transformed into electric impulses which in turn are passed through certain instruments which now change these impulses back to elements of motion. A photographic record of these movements becomes the graphic tracing known as the *fetal phonocardiogram.*

Stripped of its technical details, the apparatus is merely a method of rendering visible to the eye, sounds which are audible to the ear; in addition to this, many sounds not perceived by the human auditory mechanism are readily discovered by this electrical method of amplifying vibrations caused by rhythmic disturbance of air. In Fig. 1 is represented a schematic diagram of the apparatus used for recording

such sound waves; for clinical use a string galvanometer, such as may be found in every electrocardiographic laboratory, is substituted for the glow lamp device which is necessary for the reproduction of synchronized sound moving pictures.

The clinical application of this apparatus for the study of the fetal heart sounds has been reduced to a rather simple procedure requiring

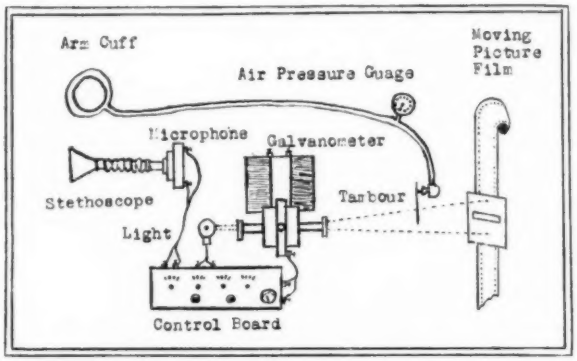

Fig. 1.—Schematic diagram of the fetal phonocardiograph showing how the fetal heart sounds are photographed simultaneously with the maternal pulse beat.

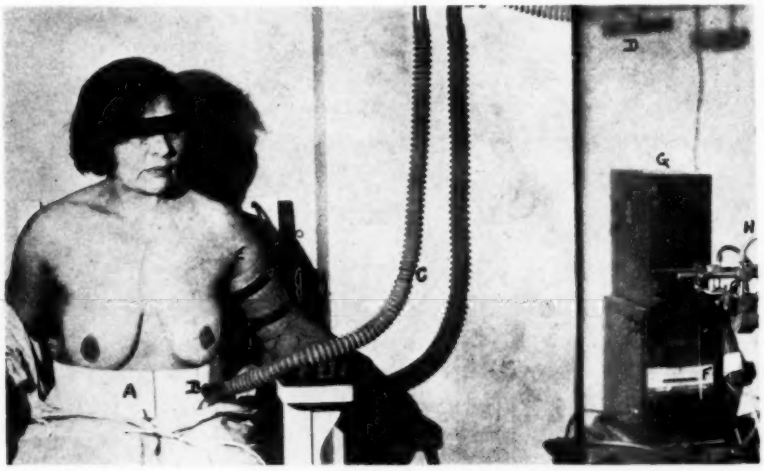

Fig. 2.—Clinical application of the fetal phonocardiogram taken simultaneously with the mother's polygraphic tracing. The important parts of the equipment are as follows: (*A*) Rubber girdle, (*B*) stethoscopic receiver, (*C*) special rubber tubing which carries the sound waves to microphone (*D*), (*E*) cuff used to compress mother's brachial artery for recording at tambour (*F*), (*G*) moving picture camera, (*H*) pressure gauge for determining diastolic pressure in polygraphic circuit.

no more than three or four minutes for its entire performance. Details of such an examination are readily seen in Fig. 2; the patient in this case is seen sitting upright in a chair. A wooden stethoscopic receiver is held firmly over the abdomen by a rubber elastic girdle; a large bore, nonexpanding rubber tube conducts the sound waves to the

microphone. From here the electric impulses are led to the galvanometer and the shadow of the oscillating string is recorded by a moving picture camera. A cuff is placed around the mother's arm and after being inflated to diastolic pressure the impulses from her brachial artery are picked up by a mechanical tambour and photographed simultaneously with the oscillations made by the sounds of

Fig. 3.—Clinical application of the fetal phonocardiogram with the mother in the reclining position. The explanatory letters in this figure are the same as in Fig. 2.

the fetal heart. In this way, simultaneous studies of the maternal and fetal circulations can be made; we shall have occasion to consider this more fully at a later time. Occasionally in very obese patients the fetal heart sounds are more readily picked up and amplified when the mother is lying upon her back. Fig. 3 shows the various parts of the equipment in somewhat greater detail; in this case a large collecting stethoscope covers a great part of the abdomen and fetal phonocardio-

grams can be made even when no heart sounds of any kind can be heard by the ordinary methods of auscultation.

Other noises and sounds that rise within the abdomen are filtered out by balanced electric circuits so that only the sounds made by the fetal heart itself are taken. Intestinal as well as uterine and fetal movements are also eliminated from the tracings; ordinarily this is accomplished without great difficulty but occasionally certain sounds may approach the frequencies made by the fetal heart and when this occurs they may render the study of the records somewhat confusing. In general, however, the rhythmic beating of the fetal heart makes it distinguishable even in the midst of louder isolated noises which arise in the abdomen of the mother.

The author's modification of the previous methods of utilizing the phonocardiograph reduces the clinical application of the equipment for the examination of the pregnant woman to a simple and easily performed procedure which is quickly learned by a nurse attendant as it requires no greater skill or dexterity than that necessary for taking electrocardiographic tracings. The attachments are readily added to any electrocardiograph and the patient experiences no more inconvenience or discomfort than that felt by the latter examination. Information secured from the fetal phonocardiogram may come to be a necessary part of every prenatal examination and facilities for the making of such examinations should be made accessible to the prenatal clinic.

THE NORMAL FETAL PHONOCARDIOGRAM

Phonocardiographic records of the heart sounds have been made for many years; Frank[1] in 1904 and Weiss and Joachim[2] in 1908 were the first to attempt recording these sounds. Einthoven,[3] Gerhartz,[4] Bull,[5] Battaerd,[6] Marbe,[7] Ohm,[8] DeMeyer,[9] and Lewis[10] are but a few of the outstanding investigators of this method. The mechanical and technical difficulties encountered in the registration of the heart sounds and the complexity of the apparatus and equipment required, did much to prevent the procedure from attaining the clinical use which the examination merited. With the discoveries and advances made in the field of radioelectrical engineering, many of the previously insurmountable difficulties were disposed of and the last few years have witnessed epoch-making strides in the perfection of the phonocardiographic method.

Scheminzky,[11] Lutenbacher,[12] Benatt,[13] Trendelenburg,[14] and Groedel[15] have within recent times developed phonocardiography to a relatively high degree of accuracy and special studies devoted to heart sounds and murmurs have done much to clarify this interesting but frequently not well understood branch of medicine. A revision of previously existing theories of heart sounds and murmurs is now tak-

ing place and many of the older widely accepted beliefs in cardiovascular disease are in the process of being changed.

Typical phonocardiographic records are shown in Fig. 4. Simultaneous electrocardiographic tracings have been taken to show the relation between the heart sounds and the electrodynamic phenomena of this organ. It will be noted immediately that although the second sound of the heart is usually described clinically as being predominant in that it is apparently the louder and longer of the two heart sounds, it is the first sound, in fact, which causes the greatest graphic oscillation. This is found to be true also in mitral stenosis where clinically the first sound of the heart is accentuated; this is seen in Fig. 10*B*.

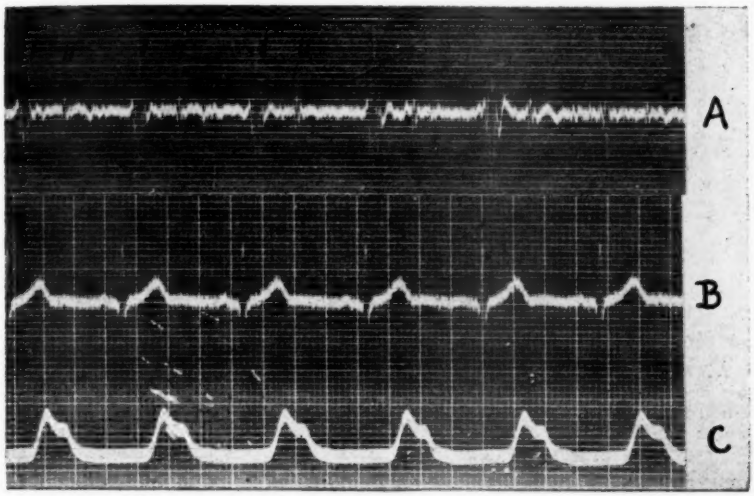

Fig. 4.—Graphic registration of the heartbeat; simultaneous study of the heart sounds, the electrodynamic activity, and the actual mechanical contraction of the heart. *A*, Phonocardiogram of normal heart sounds. Note that the first heart sound displays a greater oscillation than the second. *B*, The electrocardiogram. *C*, Polygraphic tracing of the radial pulse.

Phonocardiographic investigations of the fetal heart sounds were first attempted in 1926 by Sampson and McCalla;[16] they were able to demonstrate not only the fetal heart sounds but also the occurrence of heart murmurs occurring in utero. Certain cases of congenital heart disease were discovered and diagnosed by them prior to birth of the infant. In Fig. 5 are phonocardiographic tracings in such a case together with records made after birth of the child; I am especially indebted to these able investigators for their courtesy in permitting me to reproduce this record which is one of their original epoch-making contributions to the science of modern medicine. Using by-pass filters of different frequencies they were able to study the oscillations made by the fetal band under investigation; their records shown in Fig. 5 reproduce these frequencies from 0 to amplitudes of 1100.

Using the string galvanometer in the method previously described, I have been able to obtain graphic records of the fetal heart which compare very favorably with those secured by Sampson's more complicated apparatus. In Fig. 6 is a typical fetal phonocardiogram made during the eighth month of pregnancy; the first and second heart sounds are easily identified.

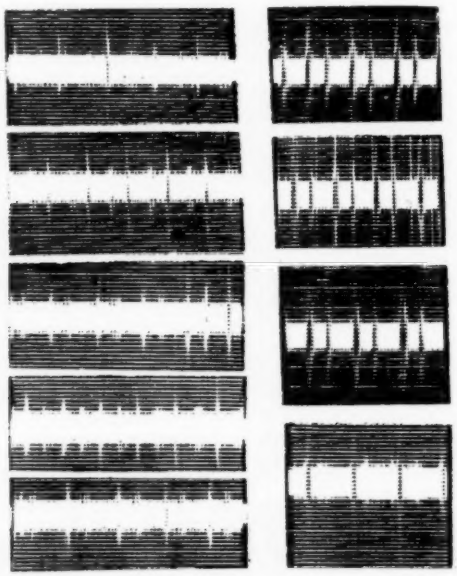

Fig. 5.—Fetal phonocardiogram taken by the Sampson method showing a well-marked sinus arrhythmia as well as a late systolic murmur.

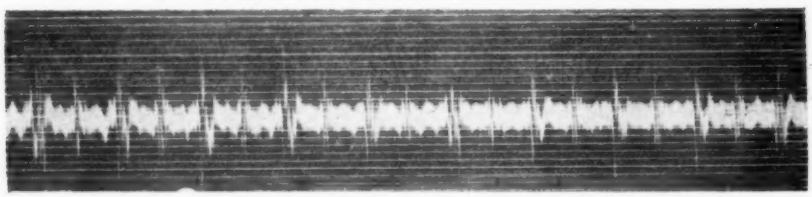

Fig. 6.—Case 7A. Mother, aged thirty-one, para ii. Phonocardiographic tracings of the fetal heart made during the eighth month of prenancy. The fetal rate is very regular and is about 148 beats per minute. Note the periodic differences in amplitude of the sound vibration.

The addition of the polygraphic tracing of the mother's brachial artery to the fetal phonocardiogram presents a method of studying the maternal and fetal circulations at the same time. Fig. 7 is a typical normal record showing the relationships of the two circulations; in this case, for example, the maternal pulse rate is 68 beats per minute while the fetal rate is 134. The opportunity for clinical research opened up by this method can only be suggested here; the influence of drugs, toxic conditions, fetal and maternal diseases, and many other

conditions can be studied in their effect upon one or the other cardiovascular system. Many obscure pathologic conditions which affect either the mother or the fetus may be investigated in regard to their mutual effect upon each other and much new information may be secured. In this connection it may be mentioned at this time that a study of the preeclamptic toxemias by this method is now under way and considerable interesting data in regard to this latter condition have already been secured.

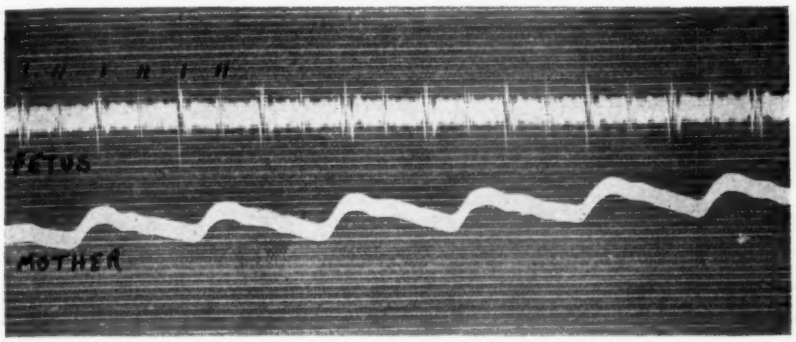

Fig. 7.—Case 21A. Mother, aged twenty-two, para iii. Simultaneous phonocardiographic tracings of the fetal heart taken during the eighth month of pregnancy and the polygraphic tracing of the mother's radial artery. Note that the fetal heart rate is regular at 134 beats per minute and the mother's pulse rate is 68 beats per minute.

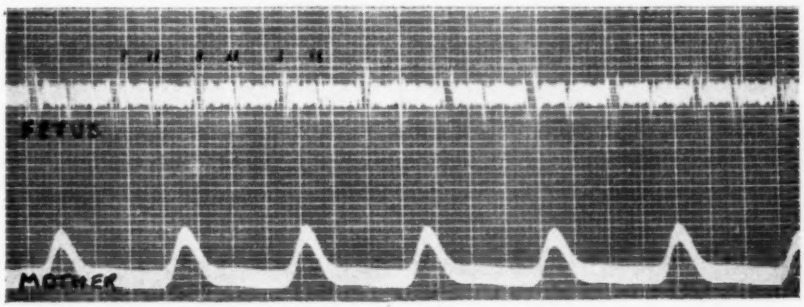

Fig. 8.—Case 41A. Normal fetal phonocardiogram. Fetal heart rate 140 beats per minute. Mother's pulse rate about 84. Tracings taken during the eighth month of pregnancy.

Of especial interest to the obstetrician is the phonocardiographic examination of the fetal heart in very obese patients; ordinarily the fetal heart is never heard during the entire period of pregnancy in such women. This is not an unfamiliar finding in every prenatal clinic; the diagnosis of gestation itself and subsequently of fetal position must be made without the fetal heart ever being heard at all. Fig. 8 represents tracings taken during the eighth month of pregnancy in a very obese patient; this woman weighed 188 pounds and had a tremendously thick abdominal wall through which nothing could be

felt, much less, heard. The tracings taken in a routine method show a regular fetal heartbeat at 150 beats per minute; the mother's pulse rate was 84 beats.

IRREGULARITIES OF THE FETAL RHYTHM

Because of the previous difficulties encountered in examining the fetal heart, no especial attention has apparently been paid to its arrhythmias; the available literature records but few instances where mention has been made of such irregularities. Drosin[17] in 1922 and again in 1925 suggested that the prenatal examination should include a more careful account of the fetal heart beyond that usually made in regard to its rate and position; he was one of the first to suggest that irregularities of the fetal heart could frequently be detected and the diagnosis of possible complications during the later weeks of pregnancy or in labor might be made.

Actual demonstration of fetal cardiac irregularities has, however, apparently been rather infrequent; Schroeder[18] has recently collected

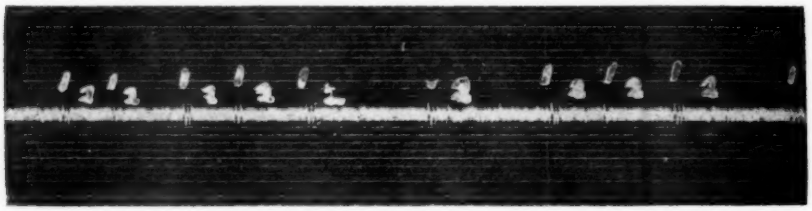

Fig. 9.—Case 12D. Mother aged twenty-six, primipara. Phonocardiogram of fetal heart made during the eighth month of pregnancy. Note the well-marked sinus arrhythmia.

all such cases recorded in the literature. He was able to find but 8 cases not including his own and he concluded that the occurrence of such irregularities must be more common than the situation suggested by the paucity of reported cases would warrant. The finding of only nine instances of fetal arrhythmia in the entire literature on the subject seems to be somewhat inexplainable in view of 21 such cases discovered by us in the past year and a half during which phonocardiographic studies have been made upon pregnant women both in the prenatal clinics and in private practice.

From a study of these 21 cases, irregularities of the fetal heart can be divided into three groups, each of which may be distinguished without difficulty. The first group includes the arrhythmias due to resonance factors within the abdomen; these resonant factors are caused by more or less rhythmic changes in the uterus itself and are most common toward the latter part of pregnancy. They apparently are concerned with uterine contraction which alters the audibility and intensity of the fetal heart sounds. To the unaided ear these changes suggest alterations in the fetal rhythm but graphic investigation has

shown that the differences are due to intensity of sound rather than change of rate. To this group are also added the cases of sinus arrhythmia which occur in utero and which may be so irregular that they might well be mistaken for a true irregularity. Sinus arrhythmia of this type is not infrequently found in infants and young children and it is to be regarded as normal; it suggests an unstable pacemaker mechanism which sooner or later becomes better regulated. It has no clinical significance; Fig. 9 shows such a case of sinus arrhythmia in utero. This record was taken during the eighth month of pregnancy; the mother was a primipara, aged twenty-six. In this connection it is interesting to point out that Sampson (see Fig. 5) previously recorded such types of sinus arrhythmia.

The second group of fetal arrhythmias consists in an interruption of the normal rhythm; this interruption when heard with an ordinary stethoscope suggests a skipped beat. When present it is distinct and recognized without difficulty; it may occur several times a minute but more often it is found only by accident. In the 21 cases of fetal arrhythmia from which this study is made there were six such cases. In Fig. 10 is presented the first case studied by phonocardiographic records and is to my knowledge the first phonocardiographic record ever made of such an irregularity. The case is briefly presented below.

CASE 4A.—Woman, aged twenty-one, primipara, pregnant seven months. The patient had been suffering from mitral stenosis for eight years; she had been decompensated once about four years ago. She was married against her physician's advice and promptly became pregnant. She was a small undeveloped girl weighing about 92 pounds; she presented no especial signs of cardiac decompensation but during the end of the sixth month her physician detected a definite irregularity of the fetal heart which was exceptionally easy to hear because of the thinness of the mother's abdominal wall. In fact the fetal heart was almost as easily heard as the mother's. Alarmed by the irregularity which he heard in the fetal rhythm, the doctor kindly referred the case to me for more complete study. The patient herself showed the usual signs of an old mitral stenosis with a typical mitralized cardiac shadow by orthodiagraphic x-ray examination. The fetal heart could be heard by all of the usual methods and a definite skip could be detected three or four times a minute. A complete graphic survey of both the mother and fetus was made and is presented in Fig. 10.

The phonocardiogram of the fetal heart shows a definite intermission in the cardiac rhythm; it is due to the loss of the second sound and without going into too great cardiologic discussion, is probably due to an extrasystole. The phonocardiogram of the mother's heart sounds is also given for comparison as well as the maternal electrocardiogram and polygraphic tracings of the radial artery; it can be noted in passing that the mother shows a right axis deviation of the heart and alterations of the P-waves seen in advanced mitral stenosis. In this figure is thus presented a complete demonstration of both the fetal and maternal circulations and it is shown here to illustrate the type of record which can be made by this method.

The mother went to full term and was delivered with some difficulty; examination of the baby the day after birth showed the irregularity still present. It was

determined at that time to be an extrasystole arising from the right ventricle; it disappeared entirely at the end of the week.

The identification of this type of fetal arrhythmia was made possible by electrocardiographic examination of the baby after birth; the

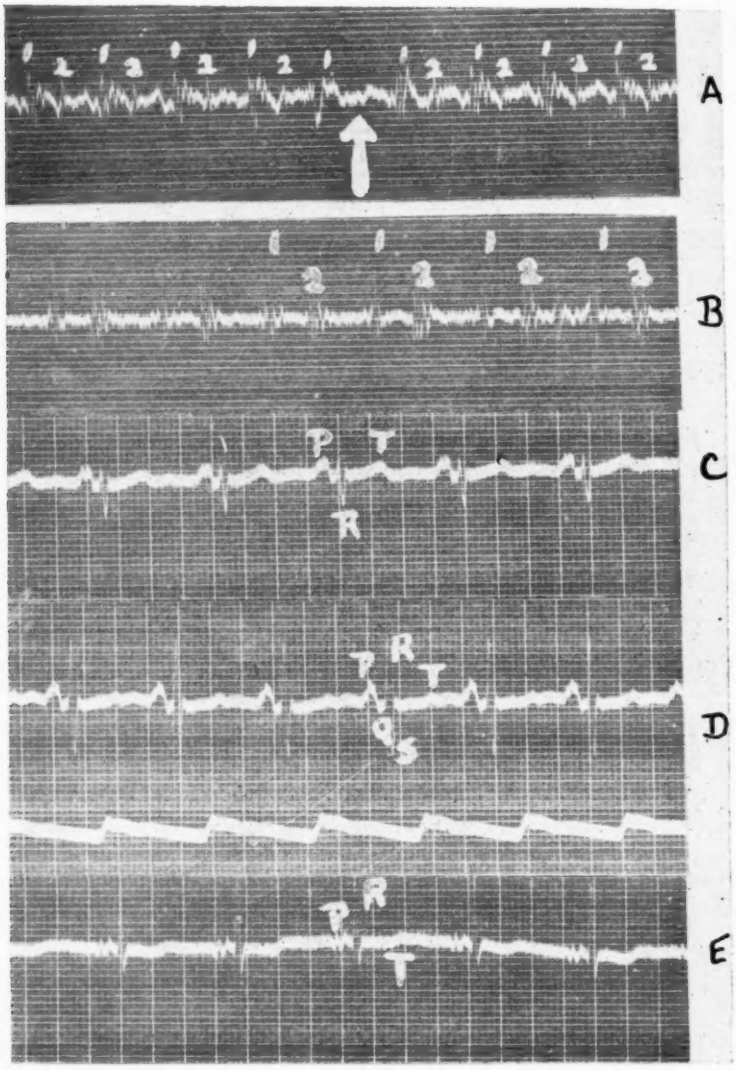

Fig. 10.—Case 4A. Graphic demonstration of fetal and maternal circulations. *A*, Phonocardiogram of fetal heart sounds; the arrow points to the skip in the rhythm heard clinically. *B*, Phonocardiogram of the mother's heart sounds. *C*, Electrocardiogram (maternal) Lead I. *D*, Lead II and polygraphic tracing of the radial artery. *E*, Lead III. The mother's electrocardiogram shows that she has a well-marked mitral stenosis.

skipping of the heartbeat heard both before and after delivery was found to be due to a noneffective right ventricular extrasystole. This finding is interesting in view of the statements made by Schroeder in

his case in which a description of an extrasystolic arrhythmia is given but he definitely states that the irregularity was not due to an ectopic beat. In his case the arrhythmia disappeared a few days after birth; this also occurred in similar cases reported by Seitz,[18] Cohn,[18] and Reihl.[18]

The other five cases found in our series presented the same type of cardiovascular disturbance in that the irregularity was due to an extrasystolic arrhythmia of right ventricular origin. In all of the cases the irregularity disappeared in a few days after birth, the longest lasting for about eight days. Of unusual interest was a case in which both mother and fetus had an extrasystolic arrhythmia; this patient, seen through the courtesy of Dr. L. Drosin, was the subject of considerable experimental study, a brief résumé of which is presented below.

CASE 29374.—A para ii, aged twenty-four, small undeveloped woman weighing 118 pounds, was seen during the eighth month of pregnancy because of a distinct irregularity heard in the fetal heart. Examination of the mother showed that

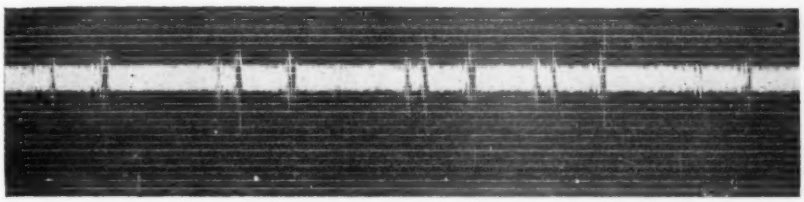

Fig. 11.—Case 29A. Mother aged twenty-six, para ii. Phonocardiographic records taken of the fetal heart during the seventh month. Note the gross irregularity of the fetal heart rhythm; it varies from 92 to 160 beats per minute. Sometimes the second sound of the heart is lost entirely. The mother's physical examination was entirely negative. Her previous pregnancy was uneventful. This patient miscarried about twelve days after these records were taken. The fetal heart sounds in this case could not be heard by the ordinary methods of auscultation due perhaps to the mother's obese abdominal wall and the weak quality of the fetal heart. The heart sounds in this case were amplified three times as much as that seen in Case 21A.

she was also suffering from an extrasystolic arrhythmia, a not especially uncommon finding during pregnancy. A phonocardiogram of the fetal heart showed the same type of irregularity as that seen in Fig. 10. There was no relation, however, between the irregularity in the fetal heart and that of the mother's as they occurred independent of each other. Two days after birth of the child, its irregularity disappeared but the mother's extrasystole still persists.

This type of irregularity apparently has no especial clinical significance as it usually disappears within a few days after birth of the infant. Schroeder thought it was due to certain neurogenic and myogenic factors developing in the fetal heart as the result of obscure metabolic phenomena; Holtermann,[18] on the other hand, believed that toxic disturbances of the maternal circulation were responsible for the condition. Our own belief is that the disturbance is the result of an irritable myocardium and an unstable pacemaker system; its clinical significance is apparently not very great, as all of the cases reported

have cleared up within a few days after delivery. Its discovery by the obstetrician should cause him no undue concern and the diagnosis of the condition is only of interest in differentiating it from the more serious types of fetal arrhythmia to be described later.

The third group of irregularities of the fetal heart are not only more common but also of more sinister significance than the previous two groups. Of the total 21 cases, 11 were found to come within this classification. The irregularity varied from a slight constant change in rhythm to a grossly perverted arrhythmia; from a clinical point of view these latter cases suggest the gross irregularity seen in the rapid auricular fibrillation of decompensated cardiac patients. While such types of auricular fibrillation are seen most commonly in late adolescent life from eighteen to thirty years of age, occasionally it is found in very young children[19] and even infants.[20] Auricular fibrillation occurring in utero has, however, never been described but examination of fetal phonocardiograms taken in this third group of cases suggests that this condition may actually be present in uterine life and may be responsible for certain hitherto unexplained abortions.

Three such cases from our series of 11 are herewith presented in some detail to illustrate the type of fetal irregularity found; these three cases are, more or less, representative of the whole group and it is to the study of these that future investigations must be devoted.

CASE 29A.—Para ii, aged twenty-six, seen during the seventh month of pregnancy. The mother's physical examination was entirely negative. Her previous pregnancy and delivery were uneventful. The fetal heart sounds could not be heard by the ordinary methods of auscultation as the patient was a very heavy woman with a large abdominal wall. The phonocardiographic examination was made to establish the presence of the fetal heart. The records obtained (see Fig. 11) showed a gross irregularity in the fetal heart rhythm which varied from 92 to 160 beats per minute; more important, however, than the mere variation in rate was the frequent loss of the second heart sound. These records were repeated on the following day with the same result. A diagnosis of gross irregularity of the fetal heart was made. About twelve days later the patient had a slight uterine hemorrhage which was followed in about an hour by a complete abortion; this occurred during the patient's stay in a near-by city and no examination of the fetus or the heart itself could be made.

CASE 34B.—Primipara, aged twenty-eight, seen during the sixth month of pregnancy. The mother's physical examination was entirely negative except for a large trace of sugar in her urine which appeared for the first time during the fifth month; her blood sugar on two examinations was 155 and 165 mg. Fetal phonocardiograms (see Fig. 12) showed a gross irregularity of rhythm and rate; the latter varied from 148 to 210 beats per minute. This irregularity could be noted also by auscultation as the patient had a thin abdominal wall. Without special treatment, save a moderate reduction of carbohydrate intake, the patient's urine became sugar-free about four days after these records were taken. About ten days later the patient suddenly miscarried and the fetus was very fortunately obtained for postmortem examination. The fetal heart was carefully sectioned but no especial pathologic changes could be detected.

CASE 44B.—Para ii, aged twenty-seven, normal physical examination. Fetal phonocardiograms (see Fig. 13) taken during the ninth month of pregnancy showed a gross irregularity in the fetal rhythm which could also be heard clinically. The rate varied from 120 to 200 beats per minute with frequent pauses of complete asystole of the heart for about a half a second. The mother was delivered without difficulty but the baby failed to breathe, resuscitation of all types including intracardiac injection of adrenalin finally resulted in automatic respiration. The infant's heart examined from time to time during the next few days showed a grossly irregular pulse; no electrocardiographic studies could be made because of inaccessability of the apparatus, the institution not being provided with this equipment. When examined, however, at the end of the third week the heart was apparently normal and the electrocardiographic tracings revealed nothing unusual.

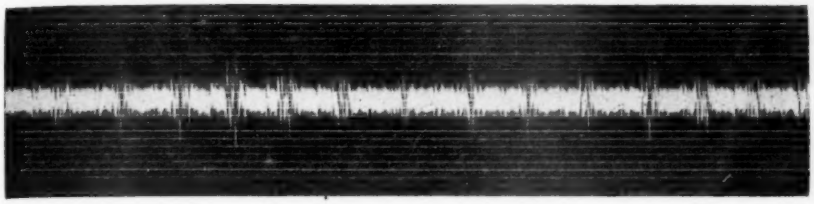

Fig. 12.—Case 34B. Mother aged twenty-eight, primipara. Phonocardiogram of fetal heart made at middle of sixth month of pregnancy. Note that the fetal heart rhythm is grossly irregular and varies from 148 to 210 beats per minute. The rhythm suggests that seen in auricular fibrillation or flutter of the adult heart and can be easily differentiated from the fetal sinus arrhythmia seen in Case 12D. The mother suddenly miscarried about two weeks after this record was taken. The obstetrician reported that no cause for the miscarriage could be found.

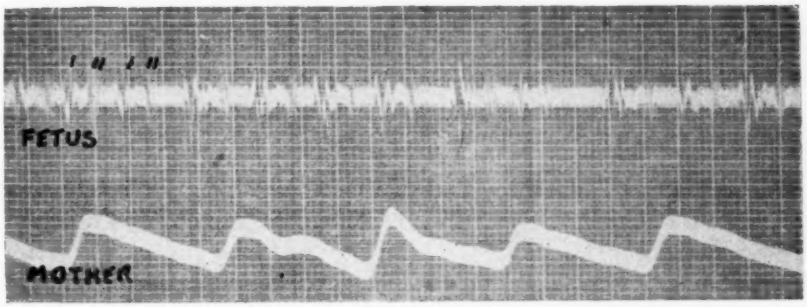

Fig. 13.—Case 44B. Gross irregularity of the fetal heart. Phonocardiogram showing fetal heart varying in rate from 200 to 120 beats per minute. At times the fetal heart shows complete asystole for about one-half second. The mother's pulse is regular at a rate of 72 beats per minute. This record was taken during the ninth month. The mother, a para ii, delivered without difficulty but the baby was resuscitated after thirty minutes.

It is of importance to note that the discovery of gross fetal cardiac irregularities was associated in these cases with either sudden interruption of pregnancy or in difficult resuscitation of the infant after delivery. No discussion of the mechanism responsible for spontaneous abortion in the first two cases so far as it relates to the disturbance of cardiac rhythm in the fetus can be entered into here, but sufficient evidence is at hand to suggest a very definite correlation between the two conditions. Only after the study of many such cases from every angle, both clinical and postmortem, can any true deductions be made

in regard to the relationship between cardiovascular disturbances in utero and the establishment of spontaneous abortion. The purpose of this paper is merely to indicate that gross irregularities of the fetal heart may be responsible for such unexplained miscarriages; from a purely cardiologic point of view, if this irregularity is a true intrauterine auricular fibrillation the *modus operandi* may not be difficult to explain as somewhat similar disturbances are seen in adult cases suffering from this disease.

SUMMARY

Study of the fetal heart sounds by means of the phonocardiogram has demonstrated that the occurrence of cardiac irregularities in uterine life is not an infrequent discovery. These irregularities can be divided into three general groups, the first two of which constitute about 80 per cent of all the irregularities. The first group consists of an exaggerated physiologic disturbance of the pacemaker mechanism in which a marked sinus arrhythmia develops; this condition persists throughout childhood and finally disappears at the latter end of adolescence. It has no especial clinical significance but it should be recognized in order to make an accurate differential diagnosis from the third and more serious group of irregularities.

The second group of fetal arrhythmias consists of a skipping or alteration in the regular rhythm of the heart; this intermission is probably due to an intrauterine extrasystolic arrhythmia. It has been previously described by several authors under different names, but the general impression seems to be that the condition is relatively unimportant inasmuch as it disappears within a few days after delivery. Our own cases substantiate this opinion and we believe that its occurrence is evidence of a hyperirritable myocardium which may be the result of improper hygiene, poor posture, or an unsuitable dietary on the part of the mother. This type of irregularity is not difficult to discover if present, and it must, like the first group of irregularities, be differentiated from the third type.

The importance of the fetal irregularities lies primarily in the further investigation of the grossly perverted types of fetal heart rhythms seen in the third group. The combined attention of both obstetrician and cardiologist must be focused upon the mechanism responsible for this change in the cardiovascular system of the fetus. If this condition is due to auricular fibrillation as is suggested by graphic studies of this disease when compared to adult types of auricular fibrillation, indications as to therapy may be made and a new avenue of approach to the possible prevention of certain types of abortion may be accomplished.

Widespread clinical application of the phonocardiographic method of examining the fetal heart will undoubtedly add considerable infor-

mation of extreme importance to the obstetrician; the opportunity presented for a simultaneous study of the fetal and maternal circulations opens up many lines of research in regard to the problems attending gestation. Some of these have previously been hinted at; a study of the various toxemias and other insufficiently understood metabolic disturbances accompanying the pregnant state can be investigated by this method. The prevention of abortion when due to heart disease of the fetus may not be unexpected when a fuller comprehension of the basic causes responsible for the condition is more readily understood by the facts brought to light by the clinical utilization of this new method of examination.

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1235 PARK AVENUE.

Neuman, H. O., and Oing, M.: Accessory Breasts and Accessory Nipples. Arch. f. Gynäk. **138**: 494, 1929.

The frequency with which accessory breasts and nipples were found in the Marburg clinic led the authors to compile statistics. The incidence in 1000 consecutive cases was 5.3 per cent; in the 500 puerperal women being 6.8 per cent, and 3.8 per cent in the 500 gynecologic patients. In 23 cases there was a marked increase in the size of these accessory breasts during pregnancy and the puerperium with active secretion. These secretions when examined microscopically, proved to be colostrum during pregnancy and milk during the puerperium. Three patients had marked swelling without active secretion. Of the gynecologic patients, 37 gave a history of swelling and secretion during previous pregnancies. Localization of these accessory breasts and nipples followed the embryonal milk line accurately, 30 per cent being above the normal breast and 70 per cent below. Embryologic studies show the milk line to extend from the axillary space down the chest and abdomen and to contain anlagen for milk glands, sebaceous glands, and hair follicles. However, only the milk glands develop as they are specialized glands. Microscopic examination of accessory breasts and nipples often showed a complete absence of excretory ducts. Patients showing a genital hypoplasia exhibited polymastia and polythelia in only 4 per cent. The authors could find no hereditary tendency toward this condition.

RALPH A. REIS.

SPIROCHETES IN PUERPERAL FEVER

By A. F. Lash, Ph.D., M.D., Chicago, Ill.

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IN THE course of bacteriologic studies of the normal and pathologic flora of the female generative tract, spirochetes were observed in the vaginal and cervical secretions of nonpregnant, pregnant, and puerperal women. These organisms did not resemble the Spirocheta pallida, and no mention was made of them in the standard works of obstetrics, gynecology, or bacteriology. Only a brief reference was made to them in Winkel's *Handbuch der Geburtshilfe* and none in the section on vaginal flora in Kolle-Wassermann's *Handbuch der pathogenen Mikroorganismen.* Since they were present with other bacteria in patients with severe and fatal puerperal fever, the subject of nonspecific spirochetes in these infections deserved consideration; especially since there were not publications in the American literature and only the observations of Philipp in the German.

The first definite reference to spirochetes was made by Hausmann in 1870 in his booklet on *Die Parasiten der weiblichen Geschlechtsorgane.* He described as "vibrionen," small threads which elongated in a snake-like manner while moving in a brisk boring manner. His illustration resembled that of a Spirocheta refringens. The secretions were obtained from girls with catarrh of the genitals, from nonpregnant and pregnant women with sour and profuse secretions.

Werner found spirochetes with gonococci in a case of chronic endocervicitis. He described the spirochetes as being plumper than the pallida variety but more slender than the mouth and teeth spirochetes.

Later his patient developed a colpitis emphysematosa; culture of the contents of the small cysts yielded a B. colon group organism. This article was the first publication on spirochetes in gynecologic literature.

There have been repeated reports in dermatologic works of finding spirochetes in the vagina, especially at the introitus in the presence of inflammatory processes, such as condylomata acuminata.

Noguchi and Kolisko described three forms in the spirochetal flora of the normal female genitalia. They studied the morphologic and bacteriologic characteristics of these forms which were named, Treponema minutum, Treponema colligyrum, and Spironema refringens.

In 1924 Philipp published the results of his study of 300 normal puerperae. He found spirochetes in 5 per cent of the vaginal smears. The three types as described by Noguchi were present. The refringens form, as found in the mouth, was large, thick and plump. The denticola type was smaller, slender with small spirals. A very small spirochete with small and hardly recognizable spirals was also present. This latter form resembled the Spirocheta icterohemorrhagica which causes Weil's disease. One single type was found or two types or all three were present. The reaction of the secretion was acid or neutral.

In these women, no pathology of a profuse discharge was present which usually occurred in the puerperium. The spirochetes were found in the vaginal vault, cervical mucus and uterine cavity. When they were found in the uterine cavity in puerperal fever, he did not consider them an etiologic factor but rather symbiotic organisms. It was chiefly in gangrenous processes that the spirochetes were seen. The spirochetes occurred in the vaginal secretions before delivery, they disappeared during delivery and then suddenly appeared in an explosive manner so that myriads were seen.

Philipp observed three cases with acute infections and described a definite clinical picture. The labia minora were more or less edematous. The vaginal mucous membrane near the portio was superficially eroded and covered with a thin necrotic layer. The vaginal discharge was serous and not foul smelling, having the appearance of egg white thinned out. The temperature was 38.5° C. The general condition was good but the patient complained of the discharge which was very annoying and produced a pruritus.

After four or five days, the acute inflammation of the genitals subsided. The superficial necrotic epithelium was cast off and the underlying cells regenerated. The edema subsided and the discharge disappeared. The temperature dropped to normal and the spirochetes disappeared. Healing occurred spontaneously, although Philipp observed that bichloride of mercury irrigation of the vagina hastened the disappearance of the spirochetes. He made the diagnosis on the local pathologic picture, dark-field examination of the secretions and stained smears. Pieces of tissue stained by the Levaditi method showed the spirochetes.

Philipp suggested that these spirochetes might be the cause of multiple sclerosis, eye infections and jaundice in puerperal sepsis which might be a Weil's disease arising from genital infection.

There have been no further publications on these nonspecific spirochetes since 1924. However, case reports of Vincent spirochetes and fusiform bacillus infection of the female genitals have been published by McCormac, Spillman and Pilot. Kanter and Pilot found spirochetes associated with the fusiform bacillus in the smegma of 58 per cent of normal pregnant women. They found the associated organisms to be staphylococci, colon bacilli, diphtheroids, and streptococci. They considered the occurrence of the fusiform bacilli and spirochetes with pyogenic bacteria in certain genital lesions as indicative of a primary or secondary rôle played by these organisms in causing ulcerative and gangrenous processes. These investigators were unable to find these organisms in the vagina.

In a series of personal studies of 98 normal pregnant women, spirochetes were observed in vaginal smears in three instances (3 per cent). In the vaginal cultures of these three patients, diphtheroids and streptococci viridans were found in one, yeasts, diphtheroids, and Micrococci tetragenes in the second and Staphylococci albus and aureus in the third. In the first two, fusiform bacilli were also seen in smears.

Smears taken from the cervix of 40 women just before salpingectomy revealed spirochetes in two cases or 5 per cent, which about equalled the incidence in normal pregnant women and in the puerperae studied by Philipp.

Of 118 patients with puerperal fever, spirochetes were observed in the cervical secretions of 8 (6.8 per cent). The clinical, pathologic, and bacteriologic observations form the basis for this paper. The clinical records of these patients are briefly as follows:

CASE 1.—R. K. Black, aged twenty, grav. ii, entered the hospital on May 20, 1925 because of vaginal bleeding, abdominal pain, and fever of two days' duration. She had delivered on May 18, 1925 a full-term baby spontaneously after a twelve-hour labor. The essential findings were temperature 102.6°, pulse 120, and respirations 28. Tenderness was present over the corpus uteri which was three fingers below the umbilicus. Cervical smear showed the three forms of spirochetes and gram-positive diplococci. The cultures yielded diphtheroids and Staphylococcus albus. Wassermann test was negative.

The septic course continued, the temperature varying between 101° and 104° F. On June 6, 1925, 0.6 gm. neoarsphenamine in aqueous solution was given intravenously. On June 8, 1925, the patient felt somewhat better and her temperature was 100.4° F. After this there was a rise to 100.6° F. once, and the temperature remained around 99.4°. On June 10, 1925, a piece of foul-smelling necrotic placental tissue was removed from the cervix. Convalescence was uneventful and the patient went home on July 6, 1925.

CASE 2.—R. R. Black, aged twenty-six, grav. v. Entered the hospital December 14, 1926 with the clinical picture of puerperal fever as in Case 1. Lochia was foul, sanguineopurulent; cervical smears showed many spirochetes with gram-positive diplococci. Wassermann was two-plus. Septic course subsided after eight days.

CASE 3.—E. S. Black, aged twenty-eight, para iv. Entered the hospital on May 27, 1925, because of lower abdominal pain and vaginal discharge of two weeks' duration. On May 13, 1925, she delivered a seven-months' baby spontaneously; anorexia was present for one week, and dizziness. The essential findings were temperature 103° F., pulse 102, respirations 24, marked tenderness in both iliac fossae. Rectal examination found the corpus somewhat enlarged, retroflexed, firm, tender and fixed with tender, fixed adnexa. The vagina appeared red and from it came a foul greenish yellow mucopurulent discharge. Smears revealed the three types of spirochetes, gram-negative, extracellular diplococci, gram-positive diplococci, gram-negative bacilli and diphtheroids. On June 1, 1925, 0.6 gm. neoarsphenamine in aqueous solution was given intravenously. An acute pharyngitis developed on June 4, 1925 and throat smears showed the Vincent spirilla and fusiform bacilli. Another dose of 0.6 gm. of neoarsphenamine was given. The following day the fever subsided and the patient made an uneventful recovery. The spirochetes disappeared from the throat and vagina.

CASE 4.—I. D. White, aged thirty-eight, para v. Entered the hospital January 14, 1927, and delivered a five-months' fetus which was followed by foul brownish amniotic fluid. Manual removal of the placenta was necessary. The temperature was 100.4° F., pulse 120, respiration 28. The uterus was prolapsed, and about half the length of the cervix protruded from the vagina. Cervical smears showed spirochetes and gram-positive diplococci; cultures grew only a nonhemolytic streptococcus. Wassermann test was negative. A moderately severe septic course followed. On January 20, 1927 patient experienced a sudden pain in the chest and coughed up a bloody sputum. Chest findings of an infarct were found. Roentgen examination of the chest on January 31, 1927, showed a cavity, 12 x 14 mm., dorsal to the middle of the right third intercostal space which was considered a probable abscess. There was consolidation dorsal to the left second intercostal space which was considered to be a preabscess consolidation. The febrile course ranged from 101.2° F. to 103.6° F. which persisted until February 8, 1927 when temperature became normal. She left the hospital on February 14, 1927.

CASE 5.—O. D. Black, aged seventeen, para ii. Entered the hospital March 8, 1927, six days after a spontaneous abortion of about a four months' pregnancy. Her chief complaints were pain in the lower abdomen and vaginal bleeding. Es-

sential findings were temperature 102.4°, pulse 124, respirations 26. The leucocyte count was 27,300. The abdomen was moderately distended, tympanitic with definite tenderness in both iliac fossae. Vaginal examination revealed the corpus the size of a two months' pregnancy, firm, fixed, and tender. The left adnexa were represented by a tennis ball sized mass which was fixed and tender. The lochia were still bloody. Cervical smear showed many of the fine variety (Treponema minutum) of spirochetes with gram-negative bacilli and gram-positive diplococci. Although streptococci were seen in the broth culture they were overgrown by a colon group bacillus on blood agar plates. The subsequent clinical course was septic in character for fifteen days, when the temperature dropped to normal and remained there.

CASE 6.—F. O. Black, aged twenty-five, para ii. Entered the hospital July 1, 1927, because of lower abdominal pain and vaginal bleeding of nine days' duration. She had been aborted by a midwife on June 19, 1927. The essential findings were those of an acute metritis, parametritis and pelvic peritonitis. The febrile reaction varied from 99.6 to 106.4° F. Cervical smears showed the three forms of spirochetes, and gram-positive cocci. Cultures yielded nonhemolytic streptococci and hemolytic Staphylococcus albus. The septic course persisted for twenty days and then subsided allowing the patient to go home on the thirtieth of July.

CASE 7.—T. R. Black, aged thirty-two, para ii. Entered the hospital on May 18, 1925 at the end of the first stage of labor and in forty minutes delivered a dead full-term baby. She had not felt life for eight days and had chills and some fever for two days associated with nausea and vomiting. The placenta was thickened and softened. After delivery the mother appeared to be toxic and in poor condition. Two large grapefruit size fibroids extended from the fundus into the right and left flanks. The lochia on the fourth day postpartum was dark, foul, granular, serosanguineous. A watery diarrhea was also present. Although there were only a few spirochetes on the twenty-second of May, there were many of the different types on the thirtieth of May in the vaginal and cervical smears. The Wassermann reaction was negative. The blood picture was hemoglobin 80 per cent, red cells 3,864,000, white cells 31,950 with 53 per cent polymorphonuclear neutrophiles. A marked septic course followed. On May 30, June 1, and 5, 0.6 gm. neoarsphenamine in aqueous solution was given intravenously. The condition varied but little and on July 1, 1925 although afebrile for three days the patent developed a thrombophlebitis of the right femoral vein. The following day she resumed her septic course and died on July 9, 1925 after being in the hospital fifty-one days. The essential autopsy findings were: subacute diphtheritic and gangrenous endometritis, huge intramural fibromyoma with red degeneration; thrombophlebitis of parauterine veins with extension into the iliac veins, inferior vena cava and retrograde extension into the right femoral vein; abscess of the culdesac with spontaneous perforation into the rectum; fibrinous and extensive fibrous pelvic peritonitis, multiple metastatic abscessed and hemorrhagic infarcts of the lungs.

CASE 8.—J. M. Black, aged thirty-eight, para iv. She entered the hospital on January 28, 1929, and aborted spontaneously a five months' dead fetus. The placenta required removal with a forceps. She was septic on admission, but on the second day postpartum she developed a foul bloody lochia. Dyspnea developed on the fourth day postpartum unassociated with any chest pain. The septic course continued, the temperature reaching 105.8° F., and pulse 160. The patient died on the eighth day postpartum. Cervical smears and culture showed spirochetes, fusiform bacilli and nonhemolytic streptococci. At necropsy the essential findings were diffuse ulcerative vaginitis; acute ulcerative gangrenous purulent endometritis and metritis, left focal purulent parametritis, multiple septic infarcts of both lungs, multiple acute abscesses of both lungs. Bacteriologic study of the uterus yielded Staphylo-

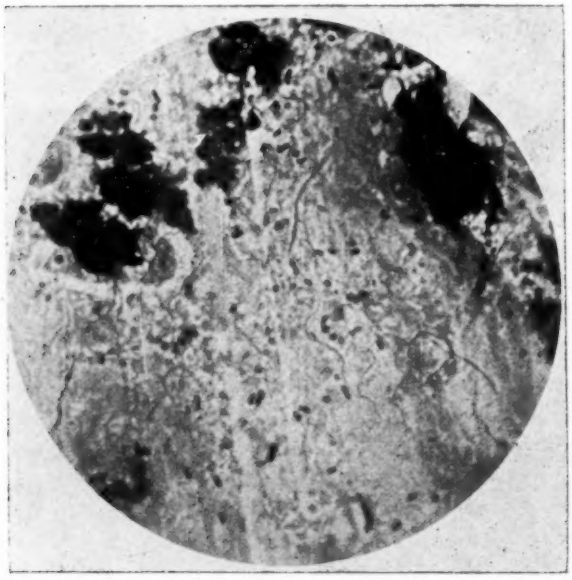

Fig. 1.—Cervical smear (gram stain) illustrating the various types of spirochetes. x1200.

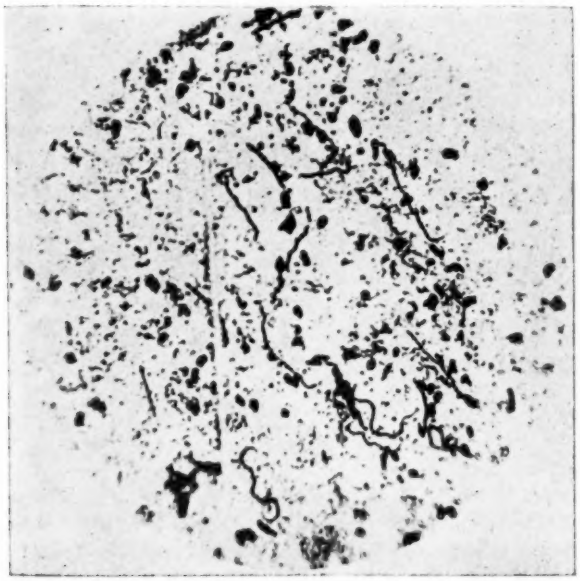

Fig. 2.—Cervical smear (Fontana stain) illustrating the various types of spirochetes. x1560.

coccus albus, nonhemolytic streptococcus; of the left parametrial abscess, pneumococci, staphylococci and bacilli of the colon group; of the septic pulmonary infarcts, pneumococci, staphylococci and bacilli of the colon group.

An attempt to cultivate the spirochetes in anaerobic brain media was unsuccessful. Smears stained by the gram method or with 10 per cent carbolfuchsin or the

Fontana method showed the various forms of spirochetes described by Noguchi. Under the dark-field microscope the spirochetes were very well seen, occurring in the various sizes and progressing by a rapid corkscrew motion.

Cervical secretions containing many spirochetes and pyogenic organisms were injected subcutaneously into a guinea pig. By the fourth day a nodule appeared in this area. By the eighth day, this nodule was soft and fluctuant. On aspirating the abscess, the pus was greenish yellow but not foul. Within a few days after the aspiration, the mass disappeared. Dark-field examination showed myriads of spirochetes and other organisms. In one field I observed a coarse spirochete lengthen while in motion and finally divide into two spirochetes. The largest and coarse spirochetes, that is, the refringens type described above, had deep curves which were six to ten in number. The medium sized and fine types had more shallow curves which were three to six in number.

An analysis of the above case reports revealed a similarity in the clinical course of this mixed infection of spirochetes and various pyogenic organisms in the puerperal generative tract. The variation in the individual cases was dependent on the degree of involvement of the uterus and adjacent structures. In Cases 1, 2, and 3, there was an acute vaginitis, endometritis, and metritis. In Cases 4, 5, and 6, acute metritis and parametritis was present, while in Cases 5, 7, and 8, a thrombophlebitis was also present and septic embolic lesions occurred. It was of interest to note the frequency of septic embolic lesions in the lungs in this very short series of cases. However, it was not surprising when one considered the studies of fusospirochetal pulmonary infections with septic emboli in the brain by Pilot and Davis.

Although the clinical course was characterized by marked febrile reaction, there was no prostration and the chief determinative finding was a sanguineopurulent lochia which was foul in some instances, and the presence of the spirochetes in the lochia.

The treatment used was based on the spirocheticidal action of arsphenamine and on the favorable influence of the drug on the fusospirochete infection of Vincent's angina and gangrenous balanitis. Koehler, in his book on the *Therapy of Puerperal Fever,* mentions arsphenamine and neoarsphenamine as therapeutic agents for stimulating antibody reaction through greater activity of the bone marrow rather than as a specific agent. In the use of the drug in addition to appreciating the usual precautions, one must use it before too marked pathologic damage has occurred. Therefore the neoarsphenamine was used for its nonspecific and probable specific effect.

CONCLUSIONS

1. A mixed infection of spirochetes and pyogenic organisms has been observed during the puerperium. These spirochetes are different from the Vincent's or pallida forms.

2. The spirochetal and pyogenic puerperal fever follows a characteristic pathologic and clinical course. The diagnosis is based on the character of the lochia and on the presence of spirochetes.

3. The therapy used in this type of infection may be considered of nonspecific and probable specific nature.

4. The importance of studying smears and the bacteriology of the lochia in puerperal infections is again illustrated. It is only by such means that definite diagnosis, prognosis, and therapy may be established in the study of puerperal fever.

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Moench, G. L., and Schulman, A. A.: Preliminary Report of the Results Obtained with Electrocoagulation in Chronic Inflammation of the Cervix Uteri. Med. J. & Rec. **131:** 131, 1930.

The methods of choice in the treatment of chronic inflammation of the cervix are the actual cautery and electrocoagulation, but the latter seems to give better results.

Electrocoagulation has certain advantages over the cautery: It produces less heat in the vagina. It is more easily controlled. There is less risk of injury to the soft parts surrounding the cervix. There is not the odor of burning flesh as in cauterization. The resulting slough separates more easily. There is less tendency to hemorrhage and less tendency to stenosis.

Electrocoagulation appears markedly superior to surgery because no inelastic scar is formed which might cause dystocia in subsequent pregnancies. As in every form of treatment discrimination must be used, neither the electrocoagulation nor any other mode of therapy constitutes a general panacea for all cervical lesions.

Wm. C. Henske.

Norris, Charles C., and Behney, Charles A.: Ovarian Transplantation. Surg. Gynec. Obst. **49:** 642, 1929.

Ovarian transplantation is not a substitute for conservation of the ovary in its normal situation and should be reserved for those cases in which this is inadvisable. The life of the transplanted ovary is probably not more than two or three years. Grafts frequently become tender for a day or two each month. They rarely give serious trouble. The operation is practically without mortality or morbidity. Most of the grafts "take." When the menopause occurs, it is generally more prolonged, gradual, and analogous to the normal menopause than if grafting had not been performed.

Wm. C. Henske.

ECTOPIC PREGNANCY*

A Clinical Study of 474 Cases

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THE knowledge of the pathogenesis, treatment, etc., of ectopic pregnancy is almost complete today, but the diagnosis is still a difficult problem. This analysis, therefore, was undertaken with the view of noting the most common signs and symptoms and, of stressing those, which though uncommon, aid greatly in making a positive diagnosis.

INCIDENCE

In the period from January 1, 1912, to March 1, 1930, a period of slightly more than nineteen years, there were 474 cases of ectopic pregnancy operated upon at Mount Sinai Hospital. The incidence in gynecologic hospital cases is about 1.5 per cent, which is in agreement with that quoted by other writers.[2, 3] However, the incidence of extrauterine gestation has best been analyzed by Schuman,[4] whose studies in the city of Philadelphia reveal one ectopic pregnancy to every 300 intrauterine pregnancies.

AGE

The age of the patients was recorded in 472 cases and ranged from nineteen to forty-five years inclusive. Thirteen patients were forty or more years of age. Three hundred patients, or 63.5 per cent, were in the decade of twenty-four to thirty-three years inclusive. The ages with the number of cases during each year of age are given in Table I.

Table I

AGE	NO. OF CASES	AGE	NO. OF CASES
19	5	33	20
20	7	34	22
21	6	35	29
22	14	36	13
23	19	37	17
24	27	38	19
25	27	39	8
26	32	40	5
27	32	41	0
28	39	42	2
29	23	43	1
30	43	44	4
31	20	45	1
32	37		

*From the Gynecological Service of the Mount Sinai Hospital, New York City.

SOCIAL STATUS

The social status was noted in 409 cases. There were 7 unmarried, 2 widowed, and 400 married patients. The length of marriage ranged from two months to twenty-six years. In the case of the widowed patients only the length of time that they lived with their husbands is given.

Table II classifies the number of cases with the respective period of marriage.

TABLE II

LENGTH	CASES	LENGTH	CASES
0 months	7	12 years	22
1- 6 "	22	13 "	12
6-12 "	16	14 "	21
12-18 "	6	15 "	15
18-24 "	1	16 "	9
2 years	21	17 "	12
3 "	23	18 "	6
4 "	36	19 "	8
5 "	28	20 "	5
6 "	25	21 "	1
7 "	18	22 "	3
8 "	27	23 "	0
9 "	16	24 "	0
10 "	33	25 "	0
11 "	15	26 "	1

PREVIOUS PREGNANCIES

In 424 cases, the history as to the number of previous pregnancies was noted. This includes induced abortion, miscarriage, and full-term delivery. Ninety-one patients, or 21.46 per cent, including 6 of the 7 unmarried patients, had never been pregnant. One patient had had 15 pregnancies. Two hundred and forty-nine or 58.73 per cent of the patients had had 1 to 3 previous pregnancies. Table III gives the relationship of the number of cases with their respective number of pregnancies.

TABLE III

NO. OF PREGNANCIES	NO. OF CASES	NO. OF PREGNANCIES	NO. OF CASES
0	91	8	4
1	84	9	1
2	85	10	1
3	60	11	0
4	39	12	1
5	23	13	0
6	18	14	0
7	6	15	1

STERILITY

It is generally believed that a period of sterility precedes an ectopic pregnancy. This may be due to previous pelvic inflammation whether caused by gonorrheal infection, a postpartum or postabortal infection, or to adhesions as the result of previous pelvic operations.

In 308 cases, the date of the last pregnancy was noted. The period between the last pregnancy and the present ectopic pregnancy ranged from three months to twenty-one years. The average period of sterility in this group of cases was 3.95 years. The history as to the use of contraceptive measures is rarely given, and, consequently, this important factor must be omitted.

TABLE IV. TIME ELAPSING BETWEEN LAST PREGNANCY AND ECTOPIC PREGNANCY

TIME	NO. OF CASES	TIME	NO. OF CASES
3 months	3	6 years	20
4 "	1	7 "	16
5 "	2	8 "	9
6 "	3	9 "	5
7 "	2	10 "	8
8 "	5	11 "	7
9 "	5	12 "	2
10 "	4	13 "	2
11 "	2	14 "	3
12 "	29	15 "	3
12-18 "	11	16 "	1
18-24 "	12	17 "	1
2 years	47	18 "	0
3 "	43	19 "	0
4 "	42	20 "	0
5 "	19	21 "	1

PRIMARY STERILITY

Primary sterility occurred in 91 cases of which 6 were unmarried. In the remaining 85 cases the length of marriage ranged from two months to nineteen years. Five patients were married only two months, while the first pregnancy, after nineteen years of sterile life in one patient, proved to be an ectopic pregnancy.

Of the married patients with primary sterility, 44 were married three years or less, while 41, or 10 per cent, of those whose length of marriage was given, were married more than three years. The per-

TABLE V

LENGTH OF MARRIAGE	NO. OF CASES	LENGTH OF MARRIAGE	NO. OF CASES
0 months	6	4 years	12
2 "	5	5 "	5
3 "	4	6 "	4
4 "	4	7 "	1
5 "	4	8 "	0
6 "	1	9 "	1
7 "	0	10 "	2
8 "	3	11 "	0
9 "	5	12 "	2
10 "	0	13 "	2
11 "	1	14 "	0
12 "	0	15 "	2
12-18 "	8	16 "	0
18-24 "	1	17 "	0
2 years	8	18 "	0
3 "	9	19 "	1

centage of primary sterility was therefore only 10 per cent. The average period of sterility in the entire group was three and five-tenths years while in those married three years or more it was six and three-tenths years.

"ONE CHILD STERILITY"

There were 81 patients who had had one pregnancy prior to the ectopic pregnancy. The shortest period between the two was three months, the longest sixteen years. Thirty-one patients had been pregnant three years or less prior to the present ectopic, while in 50 cases, or 12.22 per cent, the period of sterility was more than three years. The average period of sterility in this group was four and three-tenths years and in those sterile for more than three years it was seven and thirty-five hundredths years. The total percentage in the absolute and one child sterility group was 22.47 per cent. The average period of sterility in all cases was three and ninety-two-hundredths years.

TABLE VI. ONE CHILD STERILITY. ANALYSIS AS TO PERIOD ELAPSING BETWEEN PREGNANCY AND ECTOPIC

LENGTH OF TIME	NO. OF CASES	LENGTH OF TIME	NO. OF CASES
1- 6 months	4	7 years	3
6-12 "	4	8 "	1
12-18 "	11	9 "	2
18-24 "	6	10 "	4
2 years	6	11 "	2
3 "	12	12 "	0
4 "	10	13 "	2
5 "	6	14 "	2
6 "	5	16 "	1

ABNORMAL PREGNANCY PRIOR TO ECTOPIC

In 124 cases there was a clear history as to an abnormal pregnancy prior to the ectopic pregnancy. These cases are listed below:

Miscarriage	36
Induced abortion	51
Septic induced abortion	4
Stillbirth	1
Forceps delivery	12
Ectopic	20

It is noted that 20 of these patients had had an ectopic gestation immediately preceding the present one. In all, there were 27 patients who had had previous ectopic gestations, and in only 7 a normal pregnancy intervened between the ectopic pregnancies.

PREVIOUS PELVIC OPERATIONS

As mentioned above, previous pelvic operations, because of the various inflammatory and adhesive processes that follow, are mentioned as etiologic factors in ectopic pregnancy. There were a total of 193 operations performed.

TABLE VII. PREVIOUS PELVIC OPERATIONS

Curettage for abortion	95
Curettage for menorrhagia and metrorrhagia	5
Curettage for sterility	2
Curettage for subinvolution	4
Curettage for unknown cause	19
Ovarian cystectomy	8
Ovarian cystectomy and appendectomy	2
Appendectomy	12
Appendectomy with pelvic abscess	1
Cesarean section	1
Ectopic pregnancy (salpingectomy)	27
Avulsion of cervical polyp	1
Dudley tracheloplasty	1
Right salpingo-oophorectomy for diseased adnexa	3
Left salpingo-oophorectomy for diseased adnexa	1
Ventral suspension of uterus	2
Posterior colpotomy for pelvic abscess	5
Myomectomy	1
Amputation of cervix and colpoperineorrhaphy	1
Unknown on uterus	1
Unknown pelvic	1
In addition there were the following:	
Forceps deliveries	12
Miscarriages	123
Gonorrhea	2
Leucorrhea (profuse)	2
Stillbirth	1
Eclampsia	1
Pelvic inflammation	1

Thirty-six patients had been curetted prior to admission to the hospital because of the irregular or prolonged bleeding caused by the ectopic pregnancy, while one patient with no bleeding, but with amenorrhea, was curetted for the induction of abortion.

SYMPTOMS

The two major symptoms of ectopic pregnancy are pain and bleeding. Histories were obtained in 452 cases; 406, or 89.82 per cent, complained of varying degrees of both. Thirty-three cases, or 7.3 per cent, complained only of pain and 13, or 2.77 per cent, complained of bleeding only. Bleeding and pain generally were noted at about the

TABLE VIII. LOCALIZATION OF PAIN

Lower abdomen	245
Right lower quadrant	108
Left lower quadrant	82
Back	10
Epigastric	5
Right upper quadrant	4
Left upper quadrant	3
Entire abdomen	3
Left hip	1
No pain	13
Painful urination	29
Painful defecation	24

same time, although one or the other symptom was present for several days prior to the other in a small percentage of the cases.

Pain: The attacks are generally of three kinds. They may be acute without previous symptoms, or there may be a history of mild pain in the abdomen followed by an acute attack, or there may be repeated mild or colicky attacks which finally bring the patient to the physician.

The mild pain is probably due to repeated small hemorrhages into the peritoneal cavity, the colicky to tubal contractions, and the severe to tubal rupture with severe intraperitoneal hemorrhage. In cases where there is a collection of blood in the culdesac, painful defecation is often complained of, but this symptom is also seen in inflammatory pelvic exudates. The pain as noted in the histories was mild, cramp-like, colicky, severe, ripping, tearing, or cutting.

Bleeding: There were three modes of onset of the bleeding. The most common was after a varying period of amenorrhea. The onset of the second type was at the time of the regular menstrual period and lasted periods varying from two and one-half to eight weeks in length. In the third type the bleeding commenced one to three weeks after a normal period. Only 5 patients gave a history of a scant period followed later by spotting. Two patients had lactation amenorrhea and 15 had lost track of the periodicity of their menstruation and complained of irregular bleeding. Eight patients had neither bleeding nor amenorrhea.

The bleeding was profuse only in a small percentage of the cases, most of the patients stating that the amount of bleeding was about the same or less than that of menstruation.

MENSTRUAL HISTORY

In 190, or 43.18 per cent, of the total number of patients and 67 per cent of those who were amenorrheic, the period of amenorrhea was five to six weeks. Of the 13 patients complaining of bleeding only, 3 had tubal ruptures, 1 was unruptured, and 9 had tubal abortions. The points of rupture were very small and there was only a small collection of blood in the pelvis, this probably accounting for the absence of pain.

Of the 33 patients complaining only of pain, 2 were lactating, 6 had had no amenorrhea, and the remaining 25 had had amenorrheic periods ranging from five to twenty-two weeks. In this class there were 26 tubal ruptures, practically all having an acute onset, 1 secondary abdominal pregnancy (five and one-half months), 3 unruptured, and 3 tubal abortions.

Other Symptoms: Symptoms and signs of pregnancy, such as morning nausea and enlargement of the breasts, were conspicuous by their

TABLE IX. MENSTRUAL HISTORY

LENGTH OF AMENORRHEA	NO. OF CASES	BLEEDING WITH ONSET OF PERIOD	BLEEDING LESS THAN 4 WEEKS AFTER REGULAR PERIOD	NO AMENORRHEA AND NO BLEEDING	HISTORY OF SCANT PERIOD	LACTATION AMENORRHEA	IRREGULAR BLEEDING
5 weeks	94	66	61	8	5	2	3 mo. 10
6 "	96	(15%)	(13.86%)				4 " 2
7 "	36						6 " 3
8 "	33						
9 "	9						
10 "	10						
11 "	1						
12 "	2						
18 "	1						
22 "	1						
	283 (64.3%)						

absence in most cases. Many patients complained of nausea and vomiting but usually after an acute attack of pain.

Fainting and shoulder pain are two symptoms, which, when complained of, aid greatly in making the diagnosis. Fainting occurred one or more times in 132 patients, or 28.91 per cent, and pain in one or both shoulders occurred 28 times. However, 4 patients complained of pain under the breasts and 3 complained of pain under the ribs, making a total of 35 patients, or 7.72 per cent, who had symptoms of subphrenic hemoperitoneum.[5]

Miscellaneous symptoms complained of were: painful urination, 29; painful defecation, 24; nausea and vomiting, 60; chills, 2; complete collapse, 4.

TABLE X. TEMPERATURE AND PULSE RATES

TEMPERATURE	NO. OF CASES	PULSE RATE	NO. OF CASES
- 97° F.	3	- 70	1
97- 98	40	70- 80	68
98- 99	74	80- 90	84
99-100	195	90-100	146
100-101	110	100-110	52
101-102	23	110-120	65
102-103	4	120-130	23
103-104	1	130-140	12
104-	1	140-150	7
	451	160-	1
			469
Lowest, 96.2 (complete collapse)			
Highest, 104.2 (large infected hematocele)		Lowest, 66	
		Highest, 160	
		Imperceptible	4
		Total	473

TEMPERATURE AND PULSE RATE

Most cases had a slight rise in temperature, the majority having 101° or below. In only 29 patients was the temperature above this figure. The highest, 104.2°, occurred in an infected hematocele, and the lowest, 96.2°, in a case of severe shock with a large intraperitoneal hemorrhage. The temperature range from 99° to 101° occurred in 295, or 65.41 per cent, of the cases.

There is also an acceleration of the pulse rate. It was 100 beats per minute or lower in 299, or 63.19 per cent, of the cases and 110 beats per minute or lower in 351, or 74.18 per cent, of the total number of cases. It ranged from 66 to 160. In 4 cases radial and temporal pulses were imperceptible.

HEMOGLOBIN

Hemoglobin determinations were made in 213 cases, the lowest being 20 per cent and the highest 92 per cent. Sixty-four, or 30 per cent, had less than 50 per cent hemoglobin; in 87, or 40.84 per cent, the hemoglobin estimation ranged from 51 per cent to 70 per cent, and in the remaining cases (62) the percentage was more than 70. However, oftentimes the hemoglobin is not a correct index as to the degree of anemia as this does not drop until twenty-four to seventy-two hours after a hemorrhage.[6] The Sahli method of hemoglobin determination was used in all cases.

TABLE XI

HEMOGLOBIN DETERMINATION		LEUCOCYTE COUNT		SEDIMENTATION TIME	
PER CENT	NO. OF CASES	COUNT	NO. OF CASES	TIME	NO. OF CASES
20-30	8	-5000	1	10-15 minutes	2
30-40	18	5-10000	56	15-20 "	3
40-50	38	10-15000	67	20-25 "	1
50-60	40	15-20000	14	25-30 "	3
60-70	47	20-25000	7	30-40 "	7
70-80	43	25-30000	6	40-50 "	7
80-90	17			50-60 "	3
90-	2			60-	18
Lowest Hg.	20%	Lowest	4400	Shortest	10 min.
Highest Hg.	92%	Highest	28000	Longest	118 min.

LEUCOCYTE COUNT

In 151 cases the leucocyte count was made; the lowest, 4,400, being in a case of unruptured tubal pregnancy, and the highest, 28,000, in an infected hematocele. Counts above 15,000 were not common, though higher counts did not indicate that an infective process was present, as a relative leucocytosis is seen after a severe hemorrhage. The differential count showed nothing distinctive to aid in the differentiation from other conditions though Farrar has called attention to

the fluctuating leucocyte and differential count as an aid in the differentiation of ectopic pregnancy from purulent salpingitis.[7]

BLOOD SEDIMENTATION TEST

The sedimentation test, using the Linzenmeier method,[8] was used in 44 cases in which the diagnosis was doubtful and observation was necessary. In our experience a sedimentation time of thirty minutes or less denotes an acute inflammatory process, thirty to sixty minutes a subacute process, and sixty, or more, minutes a chronic or noninflammatory process. The sedimentation time was less than thirty minutes in 9, or 20 per cent, of the cases, thirty to sixty minutes in 17, or 38.63 per cent, and more than sixty minutes in 41.35 per cent. In 5 of the 9 cases whose sedimentation time was less than thirty minutes there were large hematoceles, two of which were infected. In another case the appendix was acutely inflamed and involved in the sac.

In our experience thirty minutes as the dividing line has sufficed to aid in the differentiation of acute salpingitis from ectopic pregnancy, as in the former the sedimentation time is less than thirty minutes in 90 per cent of the cases.

ASCHHEIM-ZONDEK TEST

The Aschheim-Zondek test for pregnancy was used in 7 cases, but, preoperatively, only in one. This patient, the five and one-half months secondary abdominal pregnancy, had a positive Aschheim-Zondek test and a positive blood test for female sex hormone by the technic of Frank and Goldberger.[9] The fetus was alive in this case. In the six other cases, the urine was obtained at the time of operation which was immediate. There were 4 tubal ruptures and 2 tubal abortions. In 5 of these the test was positive, one tubal abortion being negative.

This test is, of course, positive in intrauterine gravidity but when the question of ectopic or some other adnexal condition arises, the Aschheim-Zondek test should prove of value, especially in cases under observation where no definite signs are present by the time the test, which takes one hundred hours, is completed.

PHYSICAL EXAMINATION

The physical findings, both abdominal and pelvic, will depend upon the stage of the pregnancy as the various phases give different signs.

Abdominally tenderness is generally absent in unruptured cases or in early tubal abortion. When there is a small collection of blood, there is usually mild localized tenderness. With a moderate sized collection, as in peritubal hematocele, the tenderness is more marked, and it is acute and diffuse in tubal rupture with severe intraabdominal hemorrhage.

Muscular rigidity is remarkable by its absence, it being present in rare cases. However, voluntary spasm is often present and must not be mistaken for muscular rigidity.

Abdominal distention was seen in 49 cases, a trifle over 10 per cent. It is generally present in cases where there is a great amount of blood in the peritoneal cavity.

Free fluid was noted in 34 cases, all with tubal rupture with severe hemorrhage into the peritoneal cavity.

Pelvis: The signs of pregnancy were absent in the majority of cases. In only 2 was there violaceousness of the vulva noted and a positive Hegar was never obtained. The examination of the uterus is noted in Table XII.

TABLE XII

NORMAL	SLIGHTLY ENLARGED	DEFINITELY ENLARGED	IN-DEFINITE	SOFT-ENED	MISCELLANEOUS	
130 (29.54%)	163 (37.04%)	57 (12.95%)	90 (20.45%)	67 (15.22%)	Acute anteflexion Irregular (10-14 wk. size)	1 6

The adnexal findings are noted in Table XIII.

TABLE XIII

HARD	"CRUNCH" CLOTS	RESISTANCE	BOGGY (CUL DE SAC)	TUBULAR MASS	ENLARGED ADNEXA	INDEFINITE	FULLNESS IN FORNIX	NO MASS FELT	CYSTIC
5	23	33	108	41	9	28	42	14	115

Under cystic are included all masses described as cystic, elastic, semi-cystic, rounded, or tense. These varied in size from that of a plum to that of a grapefruit.

Definite fluid was felt in the culdesac in 10 cases.

Pulsation of the vaginal vessels was felt in 6 cases.

It is seen that in 223, or 53.35 per cent, of the cases in which there was a description of the pelvic findings, the findings were either cystic or boggy, whereas in 75, or 18 per cent, the findings were either resistance, indefinite, or no mass felt.

Tenderness was a common finding, being absent in only the unruptured cases. When there was any collection of blood the tenderness was exquisite and out of all proportion to the abdominal tenderness.

Jaundice: A definite icteric tinge to the sclerae was noted in three cases, all being large hematoceles.

Colostrum in the breasts was noted only 12 times.

DIAGNOSIS

The absolute diagnosis of ectopic pregnancy except in the "tragic case" is a difficult matter. Threatened or incomplete abortion, reten-

tion cysts of the ovary, and acute adnexal disease give rise to a chain of symptoms which can easily mimic those of ectopic pregnancy. The fact that 36 of these patients had been curetted for the bleeding, prior to admission to the hospital, is an example of the difficulty of making a correct diagnosis early in this disease.

The table of preoperative diagnoses is given below. However, in many cases the pelvic pathology diagnosed was found at operation, but the symptoms were caused by the unsuspected extrauterine pregnancy. Unfortunately it is impossible to include those cases originally diagnosed as ectopic pregnancy in which some other pelvic pathology was found. Could these be included, the percentage of error would be even greater.

TABLE XIV

PREOPERATIVE DIAGNOSIS	NO. OF CASES
Ectopic	249 (58.17%)
Ectopic, suspect	30
Ectopic or incomplete abortion	8
Ectopic or pelvic inflammation	7
Ectopic or ovarian cyst	4
Ectopic or ruptured intestinal ulcer	1
Ovarian cyst	17
Acute appendicitis	8
Abortion, incomplete	7
Fibromyomas, multiple	8
Fibroid and intrauterine pregnancy	1
Acute or subacute salpingitis	9
Tuberculous salpingitis	1
Hematocele	10
Infected hematocele (after observation)	2
Retroversion, adherent	1
Dysmenorrhea and anteflexion of uterus	1
Peritonitis	1
Uterus didelphys with pregnancy in right horn	1
Appendicitis and intrauterine gravidity	1
Undiagnosed	61 (14.25%)

Charts incomplete as to diagnosis in 46 cases. Sixty-one undiagnosed cases, several diagnoses were mentioned but operations were all exploratory laparotomies. In 30, or 7 per cent, ectopic pregnancy was suspected. In 20, or 4.67 per cent, the diagnosis lay between ectopic pregnancy and some other pelvic condition. Ten cases, or 2.33 per cent, had large hematoceles. Therefore, in 72.17 per cent of the cases, ectopic gestation was considered but in only 58.17 per cent was ectopic pregnancy the absolute diagnosis.

Immediate operation was performed in 145 cases. The average period of observation in 329 other cases was three and four-tenths days, the shortest being one day, the longest thirty-two days.

Summarizing, ectopic pregnancy must be considered, though its differentiation from incomplete abortion is difficult at this stage, when there is a history of alteration in the menstrual rhythm with bleeding or spotting and abdominal cramps. Where there is fainting and shoulder pain the diagnosis is almost absolute. In addition, if the pelvic examination shows changes coincident with pregnancy and an adnexal mass is felt, ectopic pregnancy is the reasonable diagnosis to make.

OPERATIVE FINDINGS

The operative findings are listed in Tables XV and XVI.

Free and clotted blood was found in most cases except the unruptured tubal pregnancies. In 6 of these, however, there was about one ounce of free blood. In the early tubal abortions there were only a few clots present while free fluid blood was found in the cases of recent rupture.

TABLE XV. ECTOPIC

PATHOLOGIC FINDINGS	NO. OF CASES	
Right rupture	100	37.76%
Left rupture	85	
Right tubal abortion	127	48.31%
Left tubal abortion	102	
Intraligamentous	7	
Interstitial	4	2.74%
Isthmic	9	
Unruptured	25	
Hematocele	6	
Secondary abdominal	9	

TABLE XVI. CONCOMITANT PELVIC FINDINGS

PATHOLOGIC FINDINGS	NO. OF CASES	
Ovarian cysts (Follicular, Corpus luteum, Simple)	39	
Ovarian dermoids	2	
Ovarian cyst, serous	1	
Ovarian fibroma	1	
Parovarian cysts	5	
Fibromyomata uteri	11	
Chronic salpingitis	33	10.33%
Hydrosalpinx	13	
Pyosalpinx	2	
Ovarian abscess	1	
Hematosalpinx	4	
Appendix adherent to ectopic mass	3	
Umbilical hernia	1	
Ventral hernia	1	
Retroflexed uterus	1	

It is seen that 49, or 10.33 per cent, of the cases had inflammatory processes in the other tube.

OPERATIONS PERFORMED

The operations performed are listed in Table XVII. Preliminary posterior colpotomy was performed in 77 cases and curettage in 52. Six cases of pelvic hematocele were treated by posterior colpotomy only. Wherever possible, all the accessible clots and free blood were removed, being left in the abdomen only when the patient's condition did not warrant delay. Convalescence is much more smooth when the blood is removed. Many cases develop alarming postoperative distention when the blood is left in situ.

In the earlier years the peritoneal cavity was irrigated with normal saline but this procedure has long been discontinued. If the patient's

condition warranted the procedure, other pelvic pathology was included in the operative treatment but in the last five years the appendix was not removed if free blood was encountered.

TABLE XVII

OPERATIONS PERFORMED	NO. OF CASES	
Curettage	52	(10.97%)
Posterior colpotomy	77	(16.24%)
Salpingectomy, unilateral	244	
Salpingectomy, bilateral	14	
Salpingo-oophorectomy	179	
Salpingo-oophorectomy, bilateral	3	
Salpingectomy, partial	4	
Salpingostomy	10	
Resection of ovaries	20	
Posterior colpotomy (only)	6	
Myomectomy	9	
Hysterectomy, complete	3	
Hysterectomy and bilateral salpingo-oophorectomy	1	
Hysterectomy and right salpingo-oophorectomy	1	
Hysterectomy and left salpingo-oophorectomy	1	
Ventral suspension of uterus	4	
Parovarian cystectomy	5	
Appendectomy	48	
Hernioplasty (umbilical, 1; ventral, 1)	2	
Excision rudimentary horn of uterus	1	
Ovariopexy	1	
Salpingectomy, vaginal	1	
Ligation of other tube	1	
*Dudley tracheloplasty	1	
Enterostomy (accidental)	1	
Amputation of cervix	1	
Posterior colporrhaphy	1	

*The Dudley tracheloplasty was performed in a case diagnosed as anteflexion with dysmenorrhea. Under anesthesia an adnexal mass was felt. Laparotomy was performed and the mass proved to be a tubal abortion.

All cases where posterior colpotomy was performed had a gauze drain inserted into the culdesac. In 12 cases, because of uncontrollable oozing, the pelvis was drained through the culdesac with gauze. Abdominal drainage, cigarette, was used in 9 cases. Pelvoabdominal drainage was used in 6 cases. Drainage, except for uncontrollable oozing, should not be employed and, if used, should be through the culdesac of Douglas.

SECONDARY OPERATIONS

The following secondary operations were performed:

TABLE XVIII

OPERATION	NO. OF CASES
Laparotomy with drainage of abdominal abscess due to degeneration and infection of blood left in abdominal cavity	1
Posterior colpotomy for exudate and pelvic abscess	6
Revision of infected wound	3
Suture of posterior colpotomy wound for hemorrhage	1
Suture of abdominal wall for eventration	1
Laparotomy for secondary hemorrhage	1
Colostomy and release of adhesions for intestinal obstruction	1
Release of adhesions for intestinal obstruction	1

STIMULATION

In recent years, whenever necessary, blood transfusion, either by direct or by the citrate method, has been used. Prior to the standardization of the methods for blood transfusion, stimulation in the form of enemas of coffee, whisky, and caffeine were used together with intravenous saline. In the mild cases Murphy rectal infusions of 5 per cent glucose with subcutaneous saline infusions were given. In cases of severe shock, normal saline was left in the peritoneal cavity, a procedure which was discontinued in later years.

TABLE XIX. BLOOD TRANSFUSIONS

CITRATE METHOD	UNGER	AUTO-TRANSFUSION	CANNULA TO CANNULA (DIRECT)	INTRAVENOUS	INTRAVENOUS AND TRANSFUSIONS
500 c.c. 14 times	360 c.c.—1	1500 c.c.—1	500 c.c.—1	Saline 250-500 c.c. —23	Saline 300 c.c. and citrated blood 300 c.c.—1
600 c.c. 3 times	450 c.c.—1				Saline 300 c.c. and citrated blood 500 c.c.—2
650 c.c. 1 time	500 c.c.—3				Saline 500 c.c. and whole blood (Unger) 500 c.c.—1
700 c.c. 2 times					

1 patient had 2 500 c.c. transfusions
1 patient had 700 c.c. preoperative
500 c.c. postoperative (sixth day)

TABLE XX. POSTOPERATIVE COMPLICATIONS

COMPLICATION	NO. OF CASES
Pelvic exudate	38
Pelvic exudate and wound infection	1
Pelvic exudate and bronchopneumonia	2
Wound infection	11
Wound infection and bronchopneumonia	1
Pelvic abscess	1
Herpes zoster	1
Otitis media	1
Bronchopneumonia	14
Bronchopneumonia and dilatation of stomach	1
Bronchitis	2
Bronchitis (influenzal)	1
Lobar pneumonia	8
Lobar pneumonia with pleural effusion and intestinal obstruction	1
Intestinal obstruction and subphrenic abscess	1
Cystitis	1
Mastitis	1
Pleurisy	3
Hemorrhage, secondary	1
Hemorrhage from posterior colpotomy incision	1
Vesicovaginal fistula	1
Evisceration	1
Phlebitis (femoral)	1
Intraabdominal abscess (?)	1

POSTOPERATIVE COMPLICATIONS

Although pelvic exudates developed 38 times, in only 6 was a secondary colpotomy necessary. The following complications set in postoperatively:

CURETTINGS AND DECIDUAL CAST

Although curettage was done 52 times, in only 23 was a pathologic report obtained as in many cases, no, or hardly any, curettings were obtained.

TABLE XXI

DECIDUAL CAST	DECIDUAL CAST (INFLAMED)	CURETTINGS	
7	2	Hyperplastic endometrium	2
		Decidua	8
		Decidua (necrotic)	2
		Normal endometrium	5
		Inflamed endometrium	1
		Suggesting early pregnancy (edema and hyperplasia)	2
		No evidence of pregnancy	1
		Shreds of endometrium	1
		Chorion and decidua	1

Nine decidual casts were passed.
In the case reported as chorion and decidua, the laparotomy revealed an early tubal abortion. This is the only case of intra- and extrauterine gravidity in this series.

DEATHS

There were 14 deaths with a mortality rate of 2.95 per cent. In 5 cases the immediate cause of death was the shock and anemia attendant with the severe intraperitoneal hemorrhage. Secondary hemorrhage was the cause of death in two cases. In one case this was proved at secondary operation ten hours after the first. In the other case the patient exhibited all the signs of concealed hemorrhage, was given a transfusion, but died before laparotomy could be performed. Intestinal obstruction was the immediate cause of death in two cases; rupture of the abdominal incision with eventration of the abdominal viscera in one case; pneumonia in three cases; and pulmonary edema and peritonitis in one case.

ANALYSIS OF DEATHS

1. F. L., aged forty-two, with right tubal rupture and severe intraabdominal hemorrhage. She was given 450 c.c. of citrated blood by transfusion. She died the second day postoperative of shock. The patient never rallied despite all stimulation.

2. J. S., aged thirty-three, had a supravaginal hysterectomy with left salpingo-oophorectomy performed with removal of five and one-half months' size fetal sac containing live fetus and placenta. Pelvic drainage through the cervical stump was instituted. She developed intestinal obstruction on the sixteenth day postoperative. The adhesions which had almost completely encircled the sigmoid were released and during this process the sigmoid was accidentally opened into. Col-

ostomy was performed through that opening and the obstruction was completely relieved. Patient developed a left lower lobe pneumonia with a right pleural effusion and ran an extremely high febrile course. She died six days after the second operation. Besides the above, autopsy revealed many loculated abdominal abscesses, and a subphrenic and subhepatic abscess.

3. L. M., aged twenty-six, married eleven months, had a curettage four weeks previous to admission for bleeding. She was operated upon on day of admission at which time a right tubal rupture was found. The abdomen was filled with blood. She was given 650 c.c. of blood by citrate method immediately after the operation; she developed bronchopneumonia and died on fifth day after operation in pulmonary edema.

4. D. M., aged thirty-six, admitted to the hospital in severe shock. She was operated upon immediately without anesthesia. Abdomen was found filled with blood with a right tubal rupture. A right salpingectomy was done. The patient was immediately given 250 c.c. saline intravenously followed by 500 c.c. of citrated blood. Despite all stimulation she died two hours after operation which lasted only ten minutes.

5. E. M., aged thirty-nine, was found to have a rupture of the left tube with secondary abdominal pregnancy with a four months' size fetal sac lying between the uterus, posterior surface of the broad ligament, coils of small intestine, and the sigmoid. Left salpingo-oophorectomy with removal of the sac was performed. There was no drainage. Patient developed intestinal obstruction, was operated upon the third day after operation with the release of adhesions caused primarily by organization of blood clot. She died two days after her secondary operation.

6. E. M., aged thirty-three, was operated upon for right ruptured tubal pregnancy. Posterior colpotomy and right salpingectomy were performed. On the third day postoperative she developed lobar pneumonia and died on the fifth day.

7. Y. K., aged thirty-six, was operated upon for right ruptured tubal pregnancy. Abdomen was found to be filled with blood. Right salpingo-oophorectomy was performed. She was given 300 c.c. of saline intravenously on the operating table followed by a citrate transfusion of 500 c.c. She developed peritonitis and died on the fourth day in pulmonary edema. Cause of death was peritonitis and pulmonary edema.

8. I. R., aged thirty, gave a five-week history of bleeding with the onset of her period. She had had no pain. Pelvic examination revealed a slightly enlarged uterus but no mass. Temperature and pulse normal. After a few days' observation she was curetted. She continued to bleed after curettage, and on the sixth day postoperative while in the ward, she suddenly complained of sharp, excruciating right lower quadrant pain, fainted, and collapsed. She was immediately operated upon. A right tubal abortion was found with many clots and much free blood in the peritoneal cavity. She was given intravenous medication (saline) and also intraperitoneal saline at the time of operation, when a right salpingectomy was performed. Died on the second day postoperative of shock and anemia.

9. R. H., aged thirty-five, married five years, never pregnant. At operation she was found to have a right tubal abortion with secondary abdominal pregnancy. Sac was the size of three and one-half months' pregnancy. A right salpingo-oophorectomy was performed with removal of the sac. Patient did not do well after operation. She exhibited signs of intraperitoneal hemorrhage as evidenced by weak and fast pulse, clammy skin, and air hunger. She was given 500 c.c. blood transfusions by citrate method preparatory to exploratory laparotomy but died before laparotomy could be performed. Death probably due to secondary hemorrhage.

10. E. M., aged twenty-seven, with a right ruptured tubal pregnancy. There

was much blood in the peritoneal cavity. Right salpingo-oophorectomy performed. Died on second day postoperative of bronchopneumonia.

11. G. G., aged thirty-eight, complaining of irregular bleeding of six months' duration. She was curetted by her family physician three weeks prior to admission for the above complaint. Bleeding continued and she entered the hospital at which time pelvic findings revealed only a small left-sided mass. Temperature 102°, pulse 120. She was observed for two days. Exploratory laparotomy was performed at which time left tubal abortion with a right ovarian abscess was found. There were a few old clots in the culdesac. Bilateral salpingo-oophorectomy was performed with pelvic and abdominal drainage. On the fourth day postoperative there occurred a rupture of the abdominal wound with complete eventration of the abdominal contents and a moderate amount of hemorrhage. Closure of the abdomen was immediately performed. She was given intravenous saline but died in shock one day after secondary operation.

12. S. L., aged thirty-seven, with a right ruptured interstitial pregnancy. The abdomen was filled with fluid blood. Right salpingectomy and suture of the uterine horn was performed. She was given intravenous saline and stimulation but died in shock the second day postoperative.

13. B. S., aged twenty-six, entered the hospital in shock, was immediately operated upon and right interstitial rupture was found. Abdomen was filled with fluid blood. Suture of uterine horn and right salpingectomy were performed. Intravenous saline was given. Patient never rallied and died three hours postoperative.

14. K. S., aged thirty-seven, operated upon for left tubal abortion. She also had a right chronic salpingitis. Curettage, posterior colpotomy, bilateral salpingectomy were performed. The patient showed signs of intraperitoneal hemorrhage. She was operated upon ten hours after the first for secondary hemorrhage. She was given intravenous saline and other stimulating medication but never rallied and died one day after operation.

SUMMARY AND CONCLUSIONS

1. Most ectopic pregnancies occur before the age of thirty-five, although they can occur at any stage of sex life.

2. Previous sterility does not seem to be an important factor as only 10 per cent fall into the group classed as primary sterility.

3. Pelvic infection is an important etiologic factor whether an inflammatory, postabortal, or postpartum infection. Especial note should be taken of the greater percentage of "one-child" sterility than primary due undoubtedly to the above factors.

4. The two most common symptoms are pain and bleeding. When coupled with shoulder pain and fainting, the diagnosis is almost absolute.

5. Amenorrhea of five to six weeks followed by bleeding and pain is most common, but a good number of patients had a prolonged period of bleeding with the onset of the period, while many began to bleed one to three weeks after a normal period.

6. The amount of bleeding is less than in threatened abortion, it is darker, generally does not clot. External hemorrhage may be a manifestation of the death of the ovum and occurs when the uterus is beginning to cast off the decidua. Curettings showing only decidua may be pathognomonic of extrauterine gestation.

7. The temperature shows a moderate elevation, rarely above 101° and the pulse rate is proportionately increased, the average being 90 to 110. The leucocyte count is of little value, though a high count does not indicate infection when this is present after severe intra-abdominal hemorrhage.

8. The diagnosis, except in cases with severe hemorrhage, is difficult. In this series only 58 per cent were correctly diagnosed.

9. Any change in the rhythm of the menstrual flow with bleeding and abdominal pain must make one suspect extrauterine gestation.

10. The sedimentation time of thirty minutes or over favors extrauterine pregnancy rather than inflammatory adnexal disease.

11. The Aschheim-Zondek test should prove of value in differentiating adnexal disease from extrauterine pregnancy.

12. Posterior colpotomy should be resorted to in differentiating pelvic abscess from hematocele.

13. Once the diagnosis is made, operation should be immediate except in those cases where hemorrhage has not been profuse and the patient's general physical condition (for example, cardiac status) could be benefited by appropriate preoperative treatment.

14. Blood transfusion, if necessary, should be done and in borderline cases should be performed to shorten the convalescence and aid in restoring the patient more rapidly to her normal status.

15. In this series tubal ruptures were almost as frequent as tubal abortions, 40.50 per cent tubal ruptures and 48.31 per cent tubal abortions.

16. There were 14 deaths or a mortality rate of 2.95 per cent. Five deaths were due to the anemia and shock attendant with severe hemorrhages; two were due to secondary hemorrhage, one to eventration, two to intestinal obstruction, and four to pulmonary complications. Three of the deaths due to primary hemorrhage and one of the deaths due to secondary hemorrhage occurred before the period when blood transfusion, as a therapeutic agent, was available.

I am indebted to Dr. Robert T. Frank for the privilege of reporting this material and for his aid in making this study.

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OBSERVATIONS ON THE VITAL CAPACITY DURING THE LAST MONTH OF PREGNANCY AND THE PUERPERIUM

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IN LOOKING up literature on vital capacity during pregnancy, there seemed to be such a dearth of material on this subject that it was felt some observations taken from the Obstetrical Service of this Hospital might be of value, particularly when considering the prognosis in the case of pregnant women suffering from cardiac lesions.

Bell,[1] in his paper on the vital capacity during pregnancy, states that the literature contains three references to vital capacity during pregnancy: Wintrich,[2] took vital capacity readings upon 500 women, 52 of whom were pregnant, but no definite conclusions were given upon the effect of pregnancy on the vital capacity.

Zhurakovski,[3] wrote upon vital capacity in pregnant and lying-in women, with observations on thoracic measurements during pregnancy. He found that in the largest proportion of cases (66.6 per cent) the vital capacity during pregnancy is less than on the ninth or twelfth day of the puerperium; also that spirometric magnitudes reach their highest values in the puerperium, sometimes between the ninth and twelfth days, but this may not occur until later, depending on the duration of labor as well as on a quick recovery of the breathing muscles and the abdominal pressure.

Root and Root[4] followed a normal healthy primipara through her pregnancy observing the basal metabolic rate and the vital capacity. In regard to the latter they found a higher vital capacity than the normal standard even two months before delivery, which they felt was probably due to her physical training. The vital capacity curve during pregnancy showed a slight but definite rise from the third to the eighth month. There was a marked increase during the last month. It fell to its earlier level three weeks postpartum. The theoretical reasons given for this were: (a) Increase in the chest volume noted by measurements of the chest circumference and, (b) the lightening before labor. As a supposition the vital capacity measures cardiac power and efficiency and perhaps during the last few weeks of pregnancy the heart truly gathers reserve forces in preparation for the test of labor.

Hasselbach[5] made observations on a thirty-one-year-old multipara, and with regard to the vital capacity he found that it was slightly greater in the last month than thereafter and considered it due to: (1) more complete emptying of the lungs and, (2) less residual air (quoted from Root and Root).

Wittich, Myers, and Jennings[6] found that the vital capacity readings were slightly diminished during pregnancy but were the same before and after delivery and rapidly returned to normal during convalescence. They concluded that any influence pregnancy might have was due rather to general weakness than the presence of the enlarged uterus per se.

Bell, from more than 100 readings on approximately seventy cases found that: "Results based upon weight standards are illogical during pregnancy when weight changes are uneven, and in the early stages when nutrition suffers and there is a weight loss. More satisfactory results are obtained in those cases where two or

more readings make possible a comparison of the condition of the heart and lungs at various times. One instance of four readings during the last trimester shows a progressive reduction of the vital capacity accompanying an increase in edema, dyspnea, blood pressure, and nervous instability. In pregnancy as elsewhere excessive reduction in the vital capacity is usually accompanied by heart disease demonstrable clinically. Mechanical factors seem to play a surprisingly small part in vital capacity during pregnancy, as seen in a case of twins with an abdomen which was not small to say the least'' (quoted from Myers[7]).

Klaften and Palugyay[8] state that the space available for the accommodation of the lungs during pregnancy is less than in the nonpregnant woman. This holds true especially for the lower lobes of the lung. The narrowing of the space is marked on the one hand by the upward pressure of the diaphragm and on the other hand by the decrease in the lateral diameter of the basal section of the air-containing tissue. The functioning of the lungs is, however, greater during pregnancy because, with the rate of breathing, and the vital capacity remaining constant, a greater demand upon the thoracic and diaphragmatic breathing occurs in view of the decreased space. At rest an increased functioning of the thoracic components occurs on standing and in the sitting position; this is especially true during pregnancy. The activity of the diaphragm, especially on deep breathing, is greater than in the nonpregnant woman. The diaphragm on deepest inspiration moves more strongly in the peripheral portion although on deepest expiration it rises very little higher.

Factors other than disease which affect the vital capacity of persons in good health are: (1) Excessive physical training and certain occupations which may result in a greater vital capacity than normal. (2) Age, after forty-five years a steady reduction in vital capacity is noted as age advances. (3) Obesity. (4) Posture. Christie and Beams[9] found that in a reclining position the vital capacity averaged 5.5 per cent lower than in a sitting position. Rabinowitch[10] found that if the vital capacity, taken in the recumbent position, is multiplied by the constant, 1.075, the product will approximate the vital capacity taken in the standing position. (5) Race and nationality. Foster and Hsieh[11] found that the Chinese have a lower vital capacity than the Caucasians. (6) Sex, females have a lower vital capacity than males, so much so that separate normal standards are required.

The influence of disease is best observed with cardiac disease, pleurisy (the vital capacity reduced by pain), pneumonia (which gives the most marked reduction in vital capacity of all), and pulmonary tuberculosis. Other diseases of clinical significance which may cause a reduction in the vital capacity are hyperthyroidism, emphysema, pneumothorax, pulmonary abscess, asthma (following an attack), and pulmonary neoplasms. Old pleural adhesions, deformities of the thorax, malingering, and lack of cooperation and will power must also be considered.

Peabody and Wentworth[12] found that when compared to proper standards the vital capacity of healthy persons rarely falls below 90 per cent of the normal standard although it may rise above the normal standard. Patients with heart disease show that there is a close relationship between the decrease of vital capacity and dyspnea. If the cardiac lesion is compensated for and there is no dyspnea, the vital capacity will be found normal. Burton-Opitz[13] observed fifteen students with definite evidence of heart disease. He concluded that it was only when decompensation occurred that the vital capacity was markedly decreased.

Dreyer[14] states that if the vital capacity is 10 per cent lower than the calculated normal the patient has some health depressant disease and if 15 per cent lower than the calculated normal, disease is practically certain (quoted from Myers). West[15] felt that a reduction in vital capacity below 70 per cent of the calculated normal is almost always pathologic.

In our series of 60 pregnant women, on whom vital capacity observations were taken during the last month of pregnancy and followed through the puerperium, one of the first factors encountered was to find the most practical method of estimating their normal vital capacity. A large amount of work has been done in regard to this by Peabody and Wentworth, West, Dreyer, and others, and they have found that there is a close correlation between the vital capacity and the surface area of the body. West found that the body surface (in square meters) times 2500 c.c. for men and 2000 c.c. for women more nearly approximated the normal vital capacity than any of the other estimations based on body measurements. In his series 71 per cent were within 10 per cent of normal and 5.5 per cent were 90 per cent of normal.

Meakins and Davies[16] state that in practice this formula of West's provides the simplest and most convenient method of estimating what the normal vital capacity of an individual should be. Lemon and Moersch conclude that West's formula expressed the calculated normal vital capacity the most accurately and simply of any of the methods which they investigated.

The above formula (surface area, in square meters, times 2000 c.c.) was used throughout this investigation and for each case the surface area was calculated from the height and weight using the tables of DuBois and DuBois.[18] Another factor presented itself in regard to the changes in weight during pregnancy. It was suggested that the weight be taken one month to six weeks after delivery, at the final postpartum examination, as this would more accurately represent the normal nonpregnant weight. This was done with each case and the estimated normal vital capacity calculated at this time and compared with all the actual observed vital capacity readings.

Commencing in November, 1927, patients were taken for this series as they presented themselves in the Obstetrical Out-Patient Department of this hospital. However, obese or emaciated patients were not included in this series. In all, 60 patients were observed and followed throughout the latter part of their pregnancy and puerperium. The great majority of these patients did not register in the Out-Patient Department until well advanced in their pregnancy and as a consequence more readings were obtained during the last month of pregnancy. Those registering earlier were so few in number it was felt the results might prove misleading when the vital capacities were grouped and averaged.

On registering, each patient had a thorough physical examination and her vital capacity taken in the standing position with all clothing loosened. The highest of three readings was taken, using the Sanborn water spirometer. In some cases, particularly with those not quick

to grasp the method, the highest of five readings was taken. Care was taken to see that they first expired forcibly and then after the deepest inspiration forced all the inspired air into the spirometer without leakage at the mouthpiece. This was checked by carefully watching that the nickel mouthpiece did not become befogged and also by watching the patient. On each subsequent visit the vital capacity was taken in the above manner. About 2:00 P.M. was the time of day when these observations were taken and patients showing signs of fatigue on arrival were given a rest period before the vital capacity was taken. The ages of these patients were mostly between twenty and thirty. The youngest was seventeen and the oldest forty-three. There were none who showed signs of cardiac damage in this series. However, included separately, there was one patient with severe cardiac damage who died about six weeks postpartum. The vital capacity observations on this patient will be considered later in detail. There were a number of patients registered, not included in this series because of lack of cooperation or intelligence.

Vital capacity observations were taken as soon after delivery as possible with the patient sitting up in bed. A very definite postural effect was noted as the readings were lower with the patient lying down, however, no corrections were made for the readings taken in the sitting position. With all patients having a normal puerperium, they were allowed up on the tenth day and discharged on the fourteenth day. Vital capacity readings were taken daily throughout their stay in the hospital and the final observations made on their postpartum visit, one month to six weeks after delivery.

Following delivery, in the majority of cases, there was a decided drop in the vital capacity readings from that last noted in the antenatal period. This seemed rather to be due to the fatigue following delivery and not necessarily dependent upon the length of the labor or the size of the child. The vital capacity readings steadily rose to the antepartum level and often higher, and in the great majority of cases, more closely approximated their estimated normal, even by the tenth day postpartum. In spite of the fact that the great majority of patients were allowed up on the tenth day postpartum, there was no marked or sudden increase in the vital capacity noted on this day. The average of all these patients was within 10 per cent of the estimated normal on the tenth day postpartum and remained so throughout their stay in the hospital and on their final visits. A few patients all through their pregnancy and puerperium had vital capacity readings well above their estimated normals but these were the exception.

To present all these results as simply and graphically as possible, Fig. 1 was prepared with a horizontal line representing the estimated normal vital capacity for the 60 cases. A vertical line was drawn to

show the time of delivery with spaces on either side indicating the days of the ante- and postpartum periods.

With each case the estimated normal vital capacity was calculated, as previously described, and then the actual observed vital capacity reading for each case was translated into terms of percentage above or below the estimated normal, as the case happened to be, and plotted as such on the chart. The percentage was calculated from the prepared tables of Myers (The Percentage of Vital Capacity—Women—Calculated from the Surface Area).

In the antepartum period the readings were concentrated at definite points: one month, three weeks, two weeks, one week, and one day

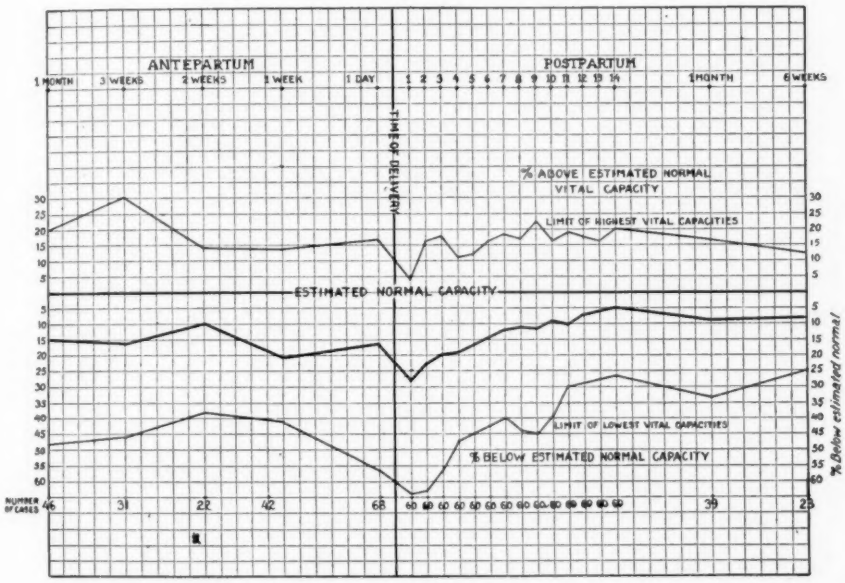

Fig. 1.—The heavy middle line shows the average of vital capacities observed on 60 cases during the last month of pregnancy and the puerperium, expressed in percentage of the estimated normal vital capacity. Each observed vital capacity was plotted in percentage above or below the estimated normal for that particular case, and the average was then taken on the whole series. The upper line represents the limits of the highest vital capacities recorded in this series, and the lower line represents the lowest recorded vital capacities. In the antepartum period at one month the average is that for 46 cases; 31 at three weeks; 22 at two weeks; 42 at one week, and 68 at one day before delivery. This, of course, depended on the regularity with which patients made their antenatal visits. In the puerperium the vital capacities were taken daily on the whole series of 60. One month postpartum 39 patients returned for their final examinations and at six weeks 23 reported. Two patients were referred back at six months thus accounting for the total of 62.

before delivery. This was done so that there would not be a few scattered observations in the intervals between causing a marked fluctuation when these were averaged. Between the two-week antepartum period and the time of delivery these scattered observations were grouped with the majority at the point nearest the time of delivery.

From a perusal of this Fig. 1 it will be seen that for the first two

weeks charted in the antepartum period the average vital capacity lies in the region of –15 per cent until the time of two weeks before delivery when there is a gradual drop until the time of delivery.

Following delivery the average drops rather sharply to –28 per cent with a gradual daily rise back to within normal limits (10 per cent) which is reached by the tenth day postpartum. Following this the average remains within the normal limits throughout the stay in the hospital and also at the final visit.

The average was found by adding all the observations noted above the estimated normal and all those below it and subtracting, in this case, the plus from the minus totals and dividing the result by the total number of observations for that particular day. The average of all these cases is represented in this figure by the heavy black central line. The other horizontal lines, above and below the average represent the highest and the lowest vital capacities registered in this series.

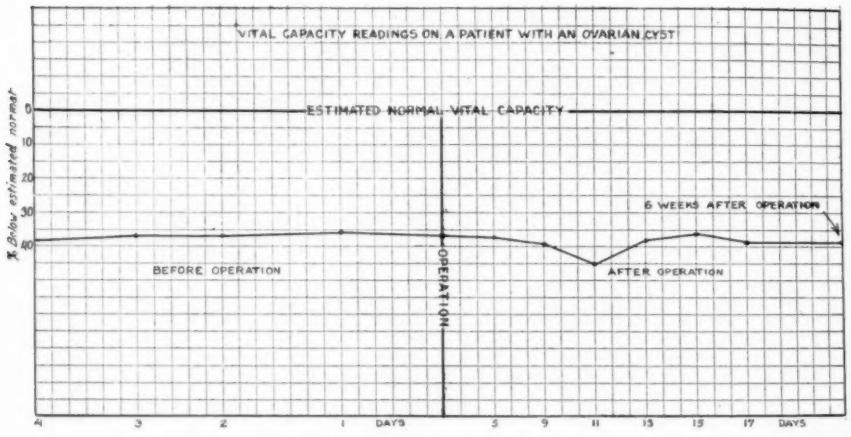

Fig. 2.—This shows the vital capacity expressed in percentage below the estimated normal vital capacity in a case with a large ovarian cyst containing 15,000 c.c. of fluid. Observations were taken on the four days preceding operation and six other observations were taken during her convalescence and a final one on her return at the end of six weeks.

CASE REPORTS

CASE 1.—(No. 22699) *Vital Capacity Observations on a Patient with a Large Ovarian Cyst.*

This patient was a thirty-eight-year-old nullipara who first came to the hospital complaining of an abdominal tumor. She stated that she had first noticed a gradual swelling of the abdomen about four years previously. This gradually increased in size until at the time of admission to the hospital she was markedly distended with a large ovarian cyst.

She was a rather frail woman: height 166.5 cm., weight 64.2 kilos, circumference of abdomen at xiphoid 97.5 cm., circumference of abdomen at umbilicus 107.5 cm.

At operation a large tense ovarian cyst was found filling the greater part of the abdominal cavity. It was necessary to drain it with a trocar before removal and it was found to contain 15,000 c.c. of fluid.

On discharge her weight was 46.4 kilos and on her return six weeks after operation her weight was 49.4 kilos. Using this latter weight to calculate the surface area her estimated normal vital capacity was 3080 c.c. Several observations were made before operation, the highest of which was 1980 c.c. After operation observations were made at intervals throughout her convalescence but there was very little charge noted from the readings taken before operation. The lowest observation recorded was 1700 c.c. and the average lay in the vicinity of 1900 c.c. All the observations noted were about a liter below the estimated normal vital capacity. Physical examination of the lungs showed a high level of dullness all round. Liver dullness commenced at the third intercostal space and the area of cardiac dullness was correspondingly moved up. Breath sounds were vesicular throughout. The bases descended on respiration less than 2 cm. On deepest inspiration there seemed to be only very moderate expansion of the thorax in spite of good cooperation. No other factor was found that might have a bearing on this lowered vital capacity.

As can be seen from the chart, the horizontal line representing her vital capacity expressed in terms of percentage runs a fairly even course before and after operation. While conclusions drawn from one case may prove misleading yet it would seem from this particular instance that this large abdominal tumor had very little effect on the vital capacity. Other writers have had similar results. Lemon and Moersch made observations on patients with ovarian cysts and other abdominal tumors and found they had little effect on the vital capacity.

On her final examination, six weeks after operation, her vital capacity was 1900 c.c.

CASE 2.—(No. 694) *Vital Capacity Observations on a Case with Severe Cardiac Damage.*

This patient was registered in the Obstetrical Out-Patient Department November 11, 1927. She was a rather small twenty-two-year-old primipara and her expected date of confinement was January 19, 1928.

During the spring of 1927 she had been on the Gynecological Service of this Hospital complaining of metrorrhagia. On physical examination she was found to have rheumatic heart disease and myocardial insufficiency with associated valvular lesions consisting of mitral insufficiency and stenosis, and aortic insufficiency. A vital capacity observation at this time was found to be 2000 c.c. In the following month she became pregnant and registered on the Obstetrical Service in November. Unfortunately her weight had not been taken before the onset of this pregnancy and as a result it was felt that her estimated normal vital capacity, calculated from the surface area, was not quite accurate. However, the estimated normal, calculated from the surface area was found to be 3020 c.c. as compared with an estimated normal of 3090 c.c. calculated from West's Height Formula ("for every centimeter in height a man gains 25 c.c. of air while a woman gains only 20 c.c. of air"). Her height was 154.5 cm. times 20 equals 3090 c.c. The former estimated normal was used, 3020 c.c., as there was so slight a difference found between them.

Using Myers' tables to calculate the percentage, her first noted vital capacity of 2000 c.c. taken in the spring of 1927, before the onset of pregnancy, was found to be −35 per cent of her estimated normal vital capacity. Subsequent observations were as follows:

DATE	ACTUAL OBSERVED VITAL CAPACITY	PER CENT BELOW THE ESTIMATED NORMAL
Nov. 11, 1927	1300 c.c.	−58
Nov. 25, 1927	700 c.c.	−80
Dec. 9, 1927	1075 c.c.	−68
Dec. 16, 1927	1010 c.c.	−69
Dec. 23, 1927	1000 c.c.	−69
Dec. 30, 1927	900 c.c.	−74

At this time she was in labor with marked dyspnea. On January 2, 1928, after a prolonged labor of seventy and one-half hours she was delivered operatively of a 2440 gm. female child, breech extraction (Mauriceau). Her pelvic measurements were normal but her labor was prolonged by irregular labor pains with poor and ineffective contractions, and morphia was administered several times to allow her to obtain several hours' rest. The actual duration of labor was thus considerably shorter than indicated.

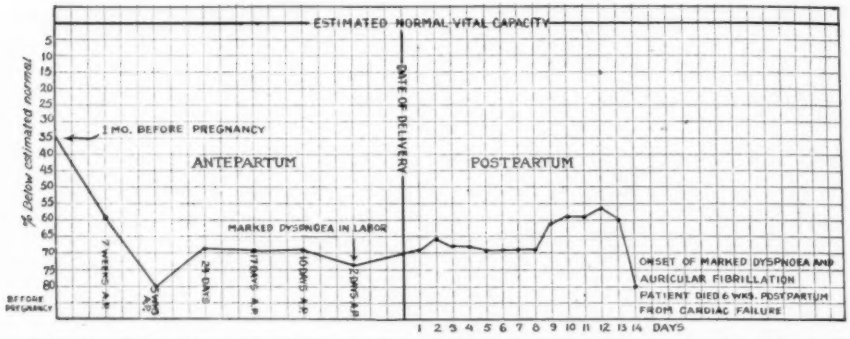
ESTIMATED NORMAL VITAL CAPACITY
% Below estimated normal
DATE OF DELIVERY
1 MO. BEFORE PREGNANCY
ANTEPARTUM
POSTPARTUM
MARKED DYSPNOEA IN LABOR
ONSET OF MARKED DYSPNOEA AND AURICULAR FIBRILLATION
PATIENT DIED 6 WKS. POSTPARTUM FROM CARDIAC FAILURE
BEFORE PREGNANCY
1 2 3 4 5 6 7 8 9 10 11 12 13 14 DAYS

Fig. 3.—This shows the vital capacity expressed in percentage below the estimated normal vital capacity, in a case with severe cardiac damage observed thoroughout the latter part of pregnancy and the puerperium.

Postpartum Observations

DATE	ACTUAL OBSERVED VITAL CAPACITY	PER CENT BELOW THE ESTIMATED NORMAL
Jan. 2, 1928	1000 c.c.	−69
Jan. 3, 1928	1100 c.c.	−66
Jan. 4, 1928	1050 c.c.	−68
Jan. 5, 1928	1050 c.c.	−68
Jan. 6, 1928	1010 c.c.	−69
Jan. 7, 1928	1010 c.c.	−69
Jan. 8, 1928	1010 c.c.	−69
Jan. 9, 1928	1225 c.c.	−61
Jan. 10, 1928	1300 c.c.	−58
Jan. 11, 1928	1300 c.c.	−58
Jan. 12, 1928	1350 c.c.	−57
Jan. 13, 1928	1200 c.c.	−60
Jan. 14, 1928	700 c.c.	−80

This was the last observation taken as the patient was too sick to cooperate with the onset of marked dyspnea and auricular fibrillation. She died six weeks postpartum. Permission for autopsy was not granted.

CONCLUSIONS

As a result of these observations it seems fair to state that in the majority of cases there is normally a gradual reduction in the vital

capacity in the last month of pregnancy. This is especially noticeable during the two-week period before delivery. Following delivery there is a fairly sharp reduction in the vital capacity with a gradual return to normal limits which is reached by the tenth day of the puerperium and remains so throughout the following days of the puerperium.

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Joachimovits, R.: Dysmenorrhea. Arch. f. Gynäk. **136:** 301, 1929.

Sixty per cent or more of patients suffering from dysmenorrhea show stigmas of genital hypoplasia, including infantile uterus. The author studied these cases by means of iodipin injections into the uterine cavity and x-ray films and shows that many uteri called infantile from bimanual examination are actually not infantile in character but show normal uterine cavities on x-ray examination. Conversely many uteri which are called normal bimanually are actually infantile, with definite infantile uterine cavities.

A second group of dysmenorrheic patients show a spasmophilia of all smooth muscle groups including the uterus, and this condition frequently follows severe nervous illnesses. It may occasionally be climactic or psychic in origin. The third group of dysmenorrheics show lesions or changes in the uterine cavity due to injuries of childbirth or abortion. The fourth group is caused by circulatory changes due to and following congenital or acquired blood vessel spasms. The last two groups result from mucous membrane derangements, and uterine and pelvic infection and inflammation. Narrowing or stricture of the cervical canal is rarely a cause of dysmenorrhea.

In patients with infantile uteri, the latter should be packed with gauze. Cervical dilatation relieves these cases for several menstrual cycles. In those patients with vasomotor disturbances, temporary relief can be obtained by exerting pressure on the abdominal aorta.

RALPH A. REIS.

FURTHER OBSERVATIONS ON THE GASTRIC JUICE IN PREGNANCY

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TOXIC or severe vomiting of pregnancy is now being treated with constantly improving results and in the past few years mortality from this cause has greatly decreased. Abortion is being discouraged, except as a life-saving measure, and the use of glucose, saline, nasal feedings is on the increase.

Today, toxic vomiting of pregnancy is recognized not as a sudden, specific toxemia, but an entity which originates with "morning sickness" and gradually becomes worse due to starvation and dehydration. Much work has been done to overcome this end result, while serious treatment in the early stages of the condition has been neglected. If we had some uncomplicated way to prevent nausea and vomiting of pregnancy at the very first or, if already it had started, we could quickly stop it, is it not probable that in a majority of cases the more serious toxemias could be prevented?

Kehrer, in 1905, reported the examination of the stomach contents during pregnancy. His findings suggest that there is a decrease in the amount of gastric hydrochloric acid, which he considers usual. His work precedes the introduction of the Rehfuss tube and the present-day fractional method of analysis. A publication by Tetsutaroo Nakai in the *Tokio Journal of Biochemistry* in October, 1925, came to our attention about a year after this work was started and presented practically the same findings reported in our first article. Nakai's work consisted of the study of the gastric juice in six cases, during the first five months, and eight cases during late pregnancy. From this work he concluded that the free acid and total acid of the gastric contents are lower and that this deficiency was more marked during the first five months.

A study of the gastric contents is naturally suggested by certain observations. A woman, during early pregnancy, may rise in the morning feeling nauseated, and after a short time vomit; a typical case of "morning sickness." After vomiting, however, she may eat a hearty breakfast without the slightest discomfort, and may not be nauseated the remainder of the day. Would this not suggest that possibly something in the fasting stomach was responsible for the nausea and vomiting, and that not until the stomach had emptied itself of its undesirable contents was it prepared to receive food? For some time it

has been known and practiced that dry feedings before getting out of bed in the morning will prevent "morning sickness" in certain cases. Is it possible that by such feedings, secretions can be stimulated or the stomach contents altered in some way to prevent gastric discomfort?

The pregnant women to be examined was instructed to eat nothing after 6 P.M. the day before, and to drink nothing after 6 A.M. the next day, when between nine and ten o'clock she swallowed a Rehfuss stomach tube, through which all of the stomach contents were removed. The tube was allowed to remain in the stomach, and was fastened with adhesive tape so that it could neither slide farther down or be pulled out. She then ate a test meal consisting of a shredded wheat biscuit and 300 c.c. of water. Fractions of approximately 10 c.c. were removed forty-five, sixty, and seventy-five minutes after the patient actually started eating the meal. Five or 10 c.c. of each sample were examined quantitatively by Toepfer's method for free hydrochloric acid and using phenolphthalein as an indicator for total acid, titrating against tenth normal sodium hydroxide. Only cases in which the tube was inserted with comparative ease were considered. The existing nausea and vomiting in some instances made it difficult for the patient to swallow the tube, and when any difficulties were encountered, such cases were not used.

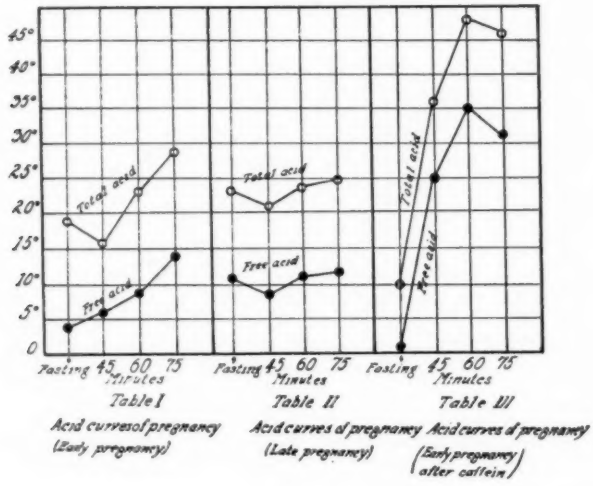
The results of this work were given in a previous paper, together with the determination of gastric chlorides in eight cases in which the total chlorides were normal or even increased. In the present paper, we wish to report on the chloride contents in the stomach of 20 additional pregnant women. The chloride values are expressed in milligrams per 100 c.c. of gastric juice. Water alone, or both water and shredded wheat were used as a test meal. These findings, according to Alvarez, would suggest a reversal of the intestinal gradient with regurgitation of alkaline duodenal material into the stomach, thereby neutralizing the acid. The reversal is probably due to a reflex resulting from hyperemia and congestion of the early pregnant uterus. Since an apparently normal acid curve is obtained following the test meal, this type of achlorhydria would be classified by Apperly as relative. Alvarez and Hosoi in a recent paper, working on pregnant rabbits, found that the gradient in irritability was flattened in some of the animals and reversed in others. The gradient of the latent period was always reversed. Conduction was somewhat changed in that waves moving orad traveled a little faster than those moving caudad. In sickly animals some gradients were reversed or flattened, while others remained normal. It is suggested that the reversal of gradients may be present in pregnant women and that it may account for some of their nausea and vomiting.

The series which was reported at first was based on 29 cases. We are presenting here our results in 50 cases, including the cases of the

first series. Practically all of these patients suffered from nausea and vomiting. The following very interesting facts were observed:

First, that free hydrochloric acid in all cases was decreased, and that this decrease was more marked during the early months when nausea and vomiting are more frequent.

Second, that 29 patients in the first three months had a total absence of hydrochloric acid. The total acid was decreased in proportion to the free acid. Table I shows the average gastric curve obtained in 35 cases of pregnancy during the second and third months. In all of these instances a test meal consisting of a shredded wheat biscuit and 300 c.c. of water was used. Table II in contrast, shows the average gastric curve obtained from six pregnant women from the fifth to the eighth month,



who earlier in pregnancy had been examined and had shown a total absence of hydrochloric acid in the fasting stomach.

Third, that in spite of the hypochlorhydria, the total chlorides in the fasting contents were normal or even increased. In an attempt to correct such anacidity and to determine if in that way nausea and vomiting could be eliminated, a series of patients were given ten to fifteen drops of dilute hydrochloric acid before meals. Some marked improvements were reported. It was found, however, that due to the already existing nausea, it was very disagreeable to take the acid, and this sometimes itself caused vomiting. A short time ago a more desirable product from the standpoint of administration was called to our attention. Muriatogen, a coated tablet consisting of a synthetic silicate which dissolves readily in water and releases the equivalent of ten minims of dilute hydrochloric acid, can very readily be taken. Possibly with such a preparation the undesirable use of hydrochloric acid can be overcome.

About two years ago, W. Morrell Roberts called attention in England to the stimulating action of caffeine on gastric secretion. He was able to demonstrate, even after paralyzing the vagus with atropine, that three grains of caffeine by mouth stimulated the secretion of hydrochloric acid in a very short time. As a result of this, we used three grains of caffeine citrate and 50 c.c. of water as a test meal and we have shown that hydrochloric acid is secreted within fifteen minutes and reaches the greatest concentration in the stomach within approximately one-half hour.

Table III shows the average gastric curve obtained in 10 cases in which 3 grains of caffeine citrate and 50 c.c. of water were used as a test meal and fractions removed every fifteen minutes. The curve indicates an immediate marked increase in the total and the free hydrochloric acid, suggesting a stimulating effect from the caffeine. We have now stopped giving the rather disagreeable hydrochloric acid and are beginning observations on the clinical effects of the use of caffeine citrate to bring about an increase in acid secretion. The caffeine citrate may not only act as a direct stimulant on gastric secretion, but may have an effect on the nervous mechanism of the gastrointestinal tract, restoring the normal downward gradient.

CONCLUSIONS

1. We wish to further emphasize the conclusions of our first paper, that free hydrochloric acid and total acid of the stomach contents are lower in pregnancy than in the nonpregnant and that this deficiency is more marked early, at the time nausea and vomiting are most common.

2. This absence of free acid is due to the fact that it is neutralized most likely by a regurgitation of the alkaline duodenal contents into the stomach.

3. Caffeine citrate in these cases has a marked ability to cause an increased secretion of hydrochloric acid.

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CONTRACTED PELVES AND DISPROPORTION*

A Report of Four Hundred and Seventy-One Cases

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DYSTOCIA due to contraction of the pelvic canal, or to disproportion between a normal pelvis and a baby is one of the most interesting and vital problems in the management of obstetrics. A contracted pelvic canal in itself is not inimicable to a normal delivery. It becomes of importance when the individual contraction presents a difficulty to the delivery of the individual baby. In other words the size of the child, and the gauge is usually the size of the child's head, as compared with the diameters of the pelvic canal which it must traverse during labor is the real criterion of disproportion. This holds true whether the pelvic canal is normal or contracted.

During the five-year period from January 1, 1924, to January 1, 1929, there were 9074 deliveries at the Royal Victoria Montreal Maternity. The pelvis and the child were studied in 5782 cases. In this latter group there were 471 cases in which either contraction of the pelvic canal or disproportion between a normal pelvis and a child was present, an incidence of 8.11 per cent. Of this number 220 or 46.7 per cent of the patients delivered spontaneously, and 251 or 53.3 per cent of the patients required some operative interference. (See Table I.)

To simplify the classification of these cases as much as possible they have been divided into four major groups: (a) the flat pelves, (b) the generally contracted pelves, (c) the masculine pelves, and (d) the diseased pelves, and the normal pelves with a large child. To these groups there has been added a fifth group, a group in which the pelvic measurements are not complete in all details but in which there was enough disproportion present to require some operative interference.

FLAT PELVES

The simple flat and the rachitic flat pelves have been included in this group of 196 cases. The external conjugate ranged from 20.5 cm. to 16.5 cm. The conjugate vera was never more than 10.5 cm. There are 52 primiparae and 144 multiparae. Spontaneous delivery occurred in 111 or 56.63 per cent of the cases, and operative interference was required in 43.37 per cent of the cases. The number of spontaneous deliveries however should be corrected from 111 to 128 as 17 additional cases had induction of labor which terminated as normal spontaneous deliveries.

*Read before the Philadelphia Obstetrical Society, Meeting of March 6, 1930.

TABLE I

No. of Patients Delivered 1924-1929	9074
No. of Patients Studied	5872
No. of Cases Showing Pelvic Contraction or Disproportion	471
No. of Cases Delivering Spontaneously	220
No. of Cases Requiring Operation	251

TYPE OF PELVIS	NO. OF CASES	DELIVERY				METHOD OF OPERATIVE PROCEDURE										MORTALITY	
		SPONTANEOUS		OPERATIVE		INDUCTION		FORCEPS		VERSION AND EXTRACTION		CESAREAN		CRANIOTOMY		FETAL	MATERNAL
			PER CENT		PER CENT		PER CENT		PER CENT		PER CENT		PER CENT		PER CENT		
Gen. Contracted	72	52	72.8	20	27.2	4(+ 2)	30.0	8	40.0			8	40.0			4	
Flat	196	111	56.7	85	43.3	17(+ 3)	23.6	16	18.8	7	8.2	41	48.2	4	4.7	23	
Masculine	113	55	48.7	58	51.3	5(+ 7)	20.6	32	55.1	2	3.4	18	31.0	1	1.7	9	
Diseased	47	2	4.0	45	96.0	2(+ 4)	13.3	9	20.0	3	6.6	22	48.8	9	20.0	11	
"Disproportion"	43	0	0	43	100.0	7(+ 5)	27.9	18	41.8	2	4.6	15	34.8	1	2.3	4	2
Total	471	220	46.7	251	53.3	35(+21)	22.3	83	33.0	14	5.5	104	41.4	15	5.9		
Fetal Mortality	51	11		39		1(+ 3)		14		7		3		15		51	
Maternal Mortality	2							1						1			2

The proportion of low forceps to spontaneous deliveries is 5 to 128 or, 1 to 25, and is not greater than the average. There are nine cases of mid forceps, all due to disproportion and all the patients with average sized children. The fetal mortality in this group is high, 44.4 per cent. There are two cases of high forceps, one in a primipara with a small baby and long labor, and the other in a multipara with an average baby and a short labor. The infant was lost in the latter case.

Cesarean section was done in 41 patients: 8 of them had had previous sections and two of them had a test of labor. The only fetal mortality in this series was due to pulmonary atelectasis.

Four of the seven patients of version and extraction had babies above the average weight. The operative indications were: anacephalus 1, prolapsed cord 2, transverse presentation 2, and prophylactic 2. Only one of the children survived, one of the two cases of transverse presentation.

Craniotomy was done in three cases. One was for a right mento-posterior presentation, a second for a left mentoanterior presentation, and the third for an impacted right occipitoposterior presentation. Embryotomy was done only once and in that instance for an impacted right occipitoposterior presentation with a very large child, in a multipara with a conjugate vera of 8.5 cm.

Induction of labor was done in 19 cases. Spontaneous delivery occurred in 17 of the cases and only two required further operative treatment, both being delivered by mid forceps. In every case the induction was done at the eighth or the eighth and a half month of the pregnancy. There was one fetal death, and that was due to intracranial hemorrhage.

The prognosis for a spontaneous or an operative delivery depends somewhat upon the degree of contraction, which may be divided into the minor, medium, and major degree. (See Table II.)

TABLE II. FLAT PELVIS. DEGREE OF CONTRACTION AND METHOD OF DELIVERY

	NO. OF CASES	SPONTANEOUS	INDUCTION	LOW FORCEPS	MID FORCEPS	HIGH FORCEPS	CESAREAN SECTION	VERSION AND EXTRACTION	CRANIOTOMY, ETC.	PER CENT DIFFICULT
Minor Degree	16	12					2		2	25.0
Medium Degree	136	90	12	4	7	1	18	5		33.8
Major Degree	44	9	7	1	2	1	21	2	2	79.5

The minor degree includes those cases with a conjugate vera of 10.5 cm. The prognosis for spontaneous delivery is good, only 25 per cent of the cases requiring operative interference. The medium degree includes those patients with a conjugate vera of from 9 to 10 cm. Prognosis for spontaneous delivery is again good but 33.82 per cent

of the patients required operative interference. The major degree includes those cases with a conjugate vera of 8.5 cm. or less. The prognosis for spontaneous delivery is poor as 79.54 per cent of the patients required operative interference.

GENERALLY CONTRACTED PELVES

The second group contains 72 patients, 23 primiparae and 49 multiparae. The external conjugate ranges from 18 to 15.5 cm. and the conjugate vera again is never more than 10.5 cm.

Spontaneous delivery occurred in 52 or 72.22 per cent of the cases. This is a considerably higher percentage than in the flat pelves. Only 27.78 per cent or 20 of the patients required operative interference.

The necessity for low forceps is only average, 1 to 18. In one case, a multipara had been in labor for ninety-three hours with an average sized child; the child was stillborn, the fetal death being due to intracranial hemorrhage. Mid forceps were done in five patients, in four of whom the labors had been longer than the average, and the children of average size. Two of the cases had been induced at the eighth and a half month of the pregnancy.

Induction was done in four other patients, all of them delivering spontaneously, making the corrected number of spontaneous deliveries 56.

The only other operative procedure in this group was cesarean section, which was done in eight cases. Two of the patients had a test of labor. One of these patients was a primipara who had an induction of labor by means of a Voorhees bag at the eighth and a half month, and after a satisfactory test of labor had a cesarean section. There was one fetal death, due to icterus neonatorum.

The prognosis for spontaneous delivery in the minor and medium degrees of contraction is good as only 26.66 per cent of the former and 18.6 per cent of the latter required operative interference. In the major degree, however, the prognosis is only fair as 42.85 per cent of the patients required operative interference. The type of operative procedure required for each of the degrees of contraction is shown in Table III.

TABLE III. GENERALLY CONTRACTED PELVIS. DEGREE OF CONTRACTION AND METHOD OF DELIVERY

	NO. OF CASES	SPONTANEOUS	INDUCTION	LOW FORCEPS	MID FORCEPS	HIGH FORCEPS	CESAREAN SECTION	VERSION AND EXTRACTION	CRANIOTOMY, ETC.	PER CENT DIFFICULT
Minor Degree	15	12	1	1	2					26.6
Medium Degree	43	36	4	2	2		3			18.6
Major Degree	14	8	1		1		5			42.8

MASCULINE PELVES

The masculine pelvis has in addition to its other well-known characteristics, a contraction of the pelvic outlet. There are 113 patients in this group, 76 primiparae and 37 multiparae. They have been subdivided according to the narrowing of the pelvic outlet as demonstrated by the distance between the ischial tuberosities. The maximum diameter is 7.5 cm.

TABLE IV. MASCULINE PELVIS. DEGREE OF CONTRACTION AND METHOD OF DELIVERY

	NO. OF CASES	SPONTANEOUS	INDUCTION	LOW FORCEPS	MID FORCEPS	HIGH FORCEPS	CESAREAN SECTION	VERSION AND EXTRACTION	CRANIOTOMY, ETC.	PER CENT DIFFICULT
Minor Degree	77	46	8	13	9	2	5	2		44.0
Medium Degree	28	13	3	5	2		7		1	58.1
Major Degree	8	1	1	1			6			87.5

Fifty-five or 47.78 per cent of the patients were delivered spontaneously. The corrected number of spontaneous deliveries is 60, as five cases having surgical induction terminated as spontaneous deliveries. The proportion of low forceps to spontaneous delivery is much higher than normal, 1 to 3; this is also true of the mid forceps, 1 to 5. There are 19 instances of the former with one fetal death due to congenital heart disease and 11 of the latter with two fetal deaths due to intracranial hemorrhage. Two patients required high forceps, both having average sized babies.

Eighteen of the patients required cesarean section, three of them having a test of labor, and three others having had previous sections. The one fetal mortality was due to intracranial hemorrhage occurring as a result of trauma during the operation.

Version and extraction was done in two cases, and both were prophylactic.

The craniotomy was done for hydrocephalus.

Induction of labor was performed in 12 cases: five patients delivered spontaneously and seven or 58.33 per cent of the patients required further operative interference. This is much greater than in the flat and generally contracted pelves.

It is interesting to note that in the 95 patients that were delivered by the pelvic canal there were 10 complete tears, an incidence of 10.52 per cent, which is higher than the normal. The average incidence of complete tears for the Royal Victoria Montreal Maternity Hospital clinics is 1.3 per cent.

The degree of contraction of the outlet may be divided into minor, medium, and major degrees. The minor degree includes those patients with a transverse of the outlet of 7.5 cm. The prognosis for spon-

taneous delivery is fair, as 44.75 per cent of the patients required operative procedures.

The medium degree includes those patients with a transverse of the outlet of from 6.5 to 7 cm. The prognosis for spontaneous delivery is poorer than in the minor degree as 57.15 per cent of the patients required operative procedures. The major degree of contraction includes those patients with a transverse of the outlet which is 6 cm. or less. Operative procedures were required in 87.5 per cent of this group and the prognosis for spontaneous delivery is therefore poor. (See Table IV.)

DISEASED PELVES

This group of 47 cases includes three large subdivisions, (a) disease of the bony pelvis, (b) disease of the pelvic organs, and (c) disease of the child.

Disease of the bony pelvis occurred in 28 patients. There are 14 cases of atypical pelvis including the Robert, the Naegele, and the obliquely contracted pelvis due to rachitis. The other 14 cases consist of old fractured pelvis, hip joint disease, pelvic osteoma, and prominent ischial spines. In the entire group only two patients delivered themselves spontaneously.

Six patients required low forceps, two of the infants were lost; three patients required mid forceps. The proportion of forceps deliveries to spontaneous deliveries is much greater than normal, 3 to 1. Version and extraction was done in three patients. In all three the operation was done as a prophylactic measure.

Craniotomy was done in three patients, the indications being as follows: impacted left occipitoposterior, impacted right occipitoposterior, and an impossible pelvis with a dead child.

Ten patients required cesarean section, two of them having had a test of labor.

Diseases of the pelvic organs were present in eleven cases. None of the patients delivered spontaneously. In eight of the cases the pelvic canal was obstructed by fibromyomas of the uterus, and delivery was accomplished by elective cesarean section. Ovarian cysts were present in two cases, one being delivered by cesarean section and the other by craniotomy after a prolonged labor. One case had had a previous Watkins interposition operation for cystocele. She was delivered by cesarean section and sterilized.

Hydrocephalus occurred in six patients with normal pelves. One case delivered spontaneously and five were delivered by craniotomy. There were two cases in which the pelves were normal, but the children were large and when Müller's test was used the head would not enter the pelvic inlet. Both patients were delivered by elective cesarean section.

DISPROPORTION, PELVIC MEASUREMENTS INCOMPLETE

This group includes 43 patients, 19 primiparae and 24 multiparae, in whom the pelvic measurements are not complete in all details; i.e., the diagonal conjugate is not given, or is recorded as "not reached." These cases were private cases of the staff. All of the patients presented definite disproportion clinically and all of them required some operative interference.

Eighteen of the patients were delivered by forceps: 6 with low forceps, 7 with mid forceps, and 5 with high forceps. There were two deaths, both due to intracranial hemorrhage. There was one maternal fatality due to septicemia.

Fifteen patients had elective cesarean section. Version and extraction was done in two cases, one for a prolapsed cord following a bag induction, and the other one for a transverse presentation, the latter child dying from intracranial hemorrhage.

Induction of labor at the eighth or the eighth and a half month was done in 13 cases. Seven of the patients or 53.85 per cent delivered spontaneously, and six or 46.15 per cent required further operative treatment. One patient was delivered by version and extraction, two required low forceps, one mid forceps, and one high forceps. One patient was delivered by craniotomy. This patient was a primipara, aged twenty, with a small but otherwise normal pelvis and a large baby. She was eight and a half months pregnant, and by abdominal examination the head was found floating above the brim. By Müller's test it was thought that the head would enter the pelvis. An induction of labor by means of a bougie was done. The pains were very inefficient and after a labor of eighty hours the cervix was dilated only 3 cm. The fetal heart became poor. A manual dilatation of the cervix was done and a high forceps attempted, but failed. A cranioclast was then used and the delivery completed. The patient became markedly toxic within a few hours. The temperature was subnormal, the circulation began to fail, and in spite of blood transfusion and other remedies the patient died the day following delivery. She had a very virulent streptococcic infection.

FETAL MORTALITY

There were 51 fetal deaths in the 471 cases, the mortality percentage from all causes being 10.82 per cent. The four major causes were: (a) intracranial hemorrhage, (b) destructive operations, (c) prolapse and other conditions of the cord, and (d) prematurity and other diseases of the newborn.

Intracranial hemorrhage occurred in 17 cases. Four of the patients delivered spontaneously, 3 were delivered by version and extraction, 9 were delivered by forceps, and one by cesarean section. Fetal intra-

cranial hemorrhage occurred in 3.65 per cent of all cases and was responsible for 33.3 per cent of the fetal mortality.

Destructive operations were done in 15 cases: 6 of them or 40 per cent were craniotomies for hydrocephalus, 8 or 53.33 per cent were craniotomies for impossible deliveries, and one or 6.67 per cent was an embryotomy for an impossible delivery. These operations occurred in 3.18 per cent of all cases and were responsible for 29.4 per cent of the fetal mortality.

Prolapse of the cord occurred in 6 cases and in one other case the cord was so tightly wound around the shoulder that it caused a fatal termination. These complications caused 13.7 per cent of the infantile mortality and occurred in 1.48 per cent of the series of cases.

Six of the fetal deaths were due to prematurity and 6 others to diseases of the newborn, not due to or a result of the labor. These conditions occurred in 2.54 per cent of all cases and caused 23.5 per cent of the fetal mortality.

The causes of the fetal deaths and the method of delivery for the entire series of cases is shown in Table V.

OPERATIONS

Operative interference was required in 251 or 53.3 per cent of the 471 cases. Forty of the fetal deaths or 78.4 per cent of the fetal deaths occurred in this group. (Table I.)

Induction of labor was done in 56 cases or 22 per cent of the operative cases. Spontaneous delivery occurred in 35 or 63.59 per cent of the cases. Further operative procedure was required in 21 or 36.41 per cent of the cases. Four fetal deaths occurred in this group, an incidence of 7.14 per cent which is slightly below the average, 10.82 per cent, for the series.

In every instance the induction of labor was preceded by an examination of the patient under anesthesia, using the Müller test to determine whether or not the fetal head would enter the inlet. If the head entered the inlet easily, an induction of labor was done. If the head entered with some difficulty and if in the opinion of the examiner, the patient could be delivered of a living child by the vaginal route, an induction of labor was done. If in his opinion, the patient could not be delivered of a living child by vaginal route an elective cesarean section was performed. If the head did not enter the inlet at all the patient was delivered by elective cesarean section.

The forceps were used in 83 cases or in 32.6 per cent. There were 14 fetal deaths with this method of delivery, an incidence of 17.8 per cent which is higher than the average for the series. There was one maternal death, and that was due to streptococcic septicemia.

Version and extraction was done in 14 cases or 5.5 per cent of the series. Seven or 50 per cent of the children were lost. In 7 of the cases,

TABLE V. FETAL MORTALITY

METHOD OF DELIVERY	NO. OF CASES	PARITY	NO. OF FETAL DEATHS	CAUSE OF FETAL DEATH												
				INTRACRANIAL HEMORRHAGE	PROLAPSED CORD	CORD TIGHT OVER SHOULDER	PREMATURE	HYDROCEPHALUS	ANACEPHALUS	PREMATURE SEPARATION	CONGENITAL HEART DISEASE	DIAPHRAGMATIC HERNIA	ICTERUS NEONATORUM	FETAL ATELECTASIS	DISPROPORTION-MALPOSITION
Spontaneous	59	P	1	1											
	135	M	4	2		1				1					
Low Forceps	25	P	2	1	1										
	6	M	2	1	1										
Mid Forceps	20	P	3	3											
	9	M	4	2	1							1			
High Forceps	7	P M	2	2											
Version and Extraction	1	P													
	8	M	6	3	2				1						
Cesarean Section	41	P	2	1										1	
	63	M	1										1		
Craniotomy	5	P	5					3							2
	8	M	8					3							5
Embryotomy	1	P M	1												1

TABLE V—CONT'D

METHOD OF DELIVERY	NO. OF CASES	PARITY	NO. OF FETAL DEATHS	CAUSE OF FETAL DEATH											
				INTRACRANIAL HEMORRHAGE	PROLAPSED CORD	CORD TIGHT OVER SHOULDER	PREMATURE	HYDROCEPHALUS	ANACEPHALUS	PREMATURE SEPARATION	CONGENITAL HEART DISEASE	DIAPHRAGMATIC HERNIA	ICTERUS NEONATORUM	FETAL ATELECTASIS	DISPROPORTION-MALPOSITION
INDUCTION															
Spontaneous	13	P	1	1											
	22	M													
Low Forceps	6	P	1								1				
	2	M													
Mid Forceps	4	P													
	2	M													
High Forceps	1	P													
	1	M													
Version and Extraction	1	P													
	4	M	1		1										
Craniotomy	1	P	1												1
		M													
Premature (Not Inductive)	4	P	1				1								
	9	M	4				4								
Breech (Easy)	4	P													
	6	M													
Twins	1	P													
	2	M	1				1								
Total	471		51	17	6	1	6	6	1	1	1	1	1	1	9

the operation was done as a prophylactic measure, two of the infants dying from intracranial hemorrhage, a mortality of 28.5 per cent. Transverse presentation was responsible for 3 other operations, only one child surviving, the other two dying from intracranial hemorrhage. Prolapse of the cord occurred three times; one of the infants survived. Anacephalus occurred once, and as the infant was a monstrosity it did not survive. Therefore of the 7 cases in which emergency version and extraction was done, 5 children were lost, a fetal mortality of 71.4 per cent. If the monstrosity is excluded, the mortality rate is 66.6 per cent.

Cesarean section was done in 104 cases or 41.4 per cent of the operative cases, nine of the patents having had a test of labor. There were three fetal deaths, an incidence of only 2.8 per cent. There were no maternal deaths from cesarean section.

Craniotomy was done in 14 cases or 5.5 per cent of the operative cases. There was one maternal death; she had had an induction of labor done. Embryotomy was done once.

SUMMARY

1. There are 471 cases of contracted pelves or disproportion between the pelvic canal and the child presented and the method of delivery analyzed, 220 patients delivering spontaneously and 251 requiring operative interference.

2. The maternal mortality for the group is 0.42 per cent, both deaths being due to streptococcic septicemia.

3. The fetal mortality for the group is 10.8 per cent, of which one-third were due to intracranial hemorrhage.

4. The high fetal mortality in version and extraction, 28.5 per cent in the prophylactic operation and 66.6 per cent in the emergency operation.

5. Surgical induction of premature labor gives results which are not inferior to other methods of delivery, the fetal mortality being lower, but the maternal mortality, due to the risk of infection, greater.

6. In 104 cases of cesarean section there was no mother lost and the fetal mortality was only 2.8 per cent.

7. Craniotomy is the method of choice in those patients in whom the child has died in utero, or in which such a severe grade of infection is present that cesarean section is contraindicated.

151 Rock Street.

(For discussion, see page 431.)

THE RELATION OF THE WEIGHT OF THE PLACENTA, CORD AND MEMBRANES TO THE WEIGHT OF THE INFANT IN NORMAL FULL-TERM AND IN PREMATURE DELIVERIES

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FOR over a hundred years clinicians have recognized that a relation exists between the weight of the placenta and the weight of the fetus. It has been tacitly assumed that the weight of the placenta was a certain fraction of the weight of the full-term infant. Williams (1923), Döderlein (1915), and DeLee (1929) give the ratio as 1:6.

Aside from its clinical significance, the relation between the weight of the placenta and that of the fetus may be of importance in a study of intrauterine growth. Some light may be thrown on such a study by the statistical analysis of a large number of instances.

The material for the present work was collected from the records of the Department of Obstetrics and Gynecology of the New Haven Hospital. Only those cases were used where the mother had no known malady. All cases of syphilis and placental bacteremia were excluded from the study. The procedure in every delivery was the same. As soon as the child was born the cord was ligated once and cut distal to the ligation, leaving a stump approximately 1 to 1½ cm. in length. The infant was weighed immediately following delivery. The placenta, cord and membranes, from which the blood clots had been removed by a pair of forceps, were weighed in the laboratory. In every instance the gross diagnosis was checked by a microscopic study of placental tissue.

The procedure of weighing the placenta was made as uniform as practicable, and the result is used in the present analysis without any attempt to estimate the weight of placental tissue exclusive of blood and other fluid which may remain. The result of such a weighing will be designated as the placental weight.

The work reported in this paper deals with 4,129 instances distributed in two main classes. There were 126 instances from deliveries where the fetuses weighed from 7 to 1,500 gm.; 4,003 instances were from normal deliveries, where the infants were born alive and weighed from 1,500 to 7,250 gm. In the latter class, the males and females were analyzed separately.

The results of the comparative weights for 1,963 females are given in Table I. In order to form the correlation table, a subdivision was made by cross classification, using an interval of 250 gm. for infant weight and 25 gm. for placental weight. It can be seen from the table that there is a positive correlation between the two. The correlation coefficient was found to be 0.484.

Chart I

Female Infants Weighing over 1500 grams

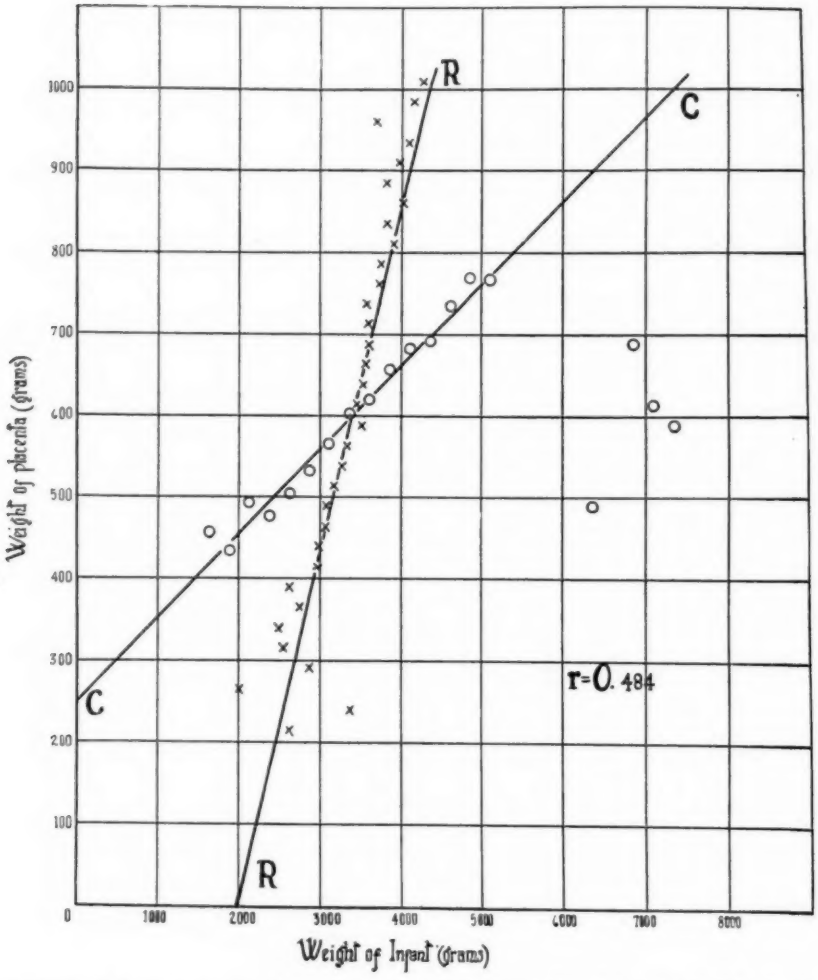


Chart 1 shows regression lines plotted from the data of Table I, and the means of the rows and columns. The means are very well fitted to the regression lines. It may be noted that the points which deviate most markedly from their corresponding lines represent only a small number of instances.

TABLE I. FEMALE INFANTS WEIGHING OVER 1500 GRAMS

WEIGHT OF PLACENTA (GRAMS)	1500-1749	1750-1999	2000-2249	2250-2499	2500-2749	2750-2999	3000-3249	3250-3499	3500-3749	3750-3999	4000-4249	4250-4499	4500-4749	4750-4999	5000-5249	5250-5499	5500-5749	5750-5999	6000-6249	6250-6499	6500-6749	6750-6999	7000-7249	7250-7499	
1000-1024										1	3	1			1										6
975- 999									1	1	1	1		1											5
950- 974							1	2	1	1	1		1												7
925- 949									1				1												2
900- 924							1	2	2	3	2	3		1	1										15
875- 899							1	3	1	2	2		1	1											11
850- 874							1	4	4	6	4	3	6	1											29
825- 849						2		1	6	3	6	2	1												21
800- 824					1	1	1	6	5	9	4	5	5	2											39
775- 799						1		3	3	6	2	2													17
750- 774					1	2	2	10	17	14	8	3	1	2											60
725- 749			1		2		6	6	14	5	4	3	1												42
700- 724			2		1	3	16	22	36	18	9	8	3		2										120
675- 699					3	4	13	18	13	12	10	3	2	2								1			81
650- 674				2	5	9	22	30	31	22	11	6	5	2	1										146
625- 649			1	4		8	14	16	33	12	7	6	1	2											104
600- 624			2	3	7	17	44	44	57	30	14	6	3			1							1		229
575- 599			2	1	4	7	22	33	28	20	5	6	1		1									1	131
550- 574		1	2	2	10	26	39	44	37	17	11	5													194
525- 549	1	1	2	1	8	13	31	18	26	9	4	1	1												116
500- 524	1	3	6	4	18	37	56	36	27	8	6	4	1												207
475- 499	1	2		4	11	13	17	13	7	2	1	1								1					73
450- 474	1		1	5	14	22	37	19	11	5	1		1												117
425- 449			4	6	8	3	5	9	7	2															44
400- 424		4	2	9	10	19	11	9	10	3	2														79
375- 399	1		5		8	3	2	1	1																21
350- 374			1	5	6	5	3	1	1																22
325- 349	1	1	2	2	2	3	2																		13
300- 324		2		2	1		1		1																7
275- 299						1																			1
250- 274		1	1																						2
225- 249								1																	1
200- 224					1																				1
	6	15	34	50	121	199	348	351	381	211	118	69	35	14	6	1				1		1	1	1	1963

WEIGHT OF INFANT (GRAMS)

TABLE II. MALE INFANTS WEIGHING OVER 1500 GRAMS

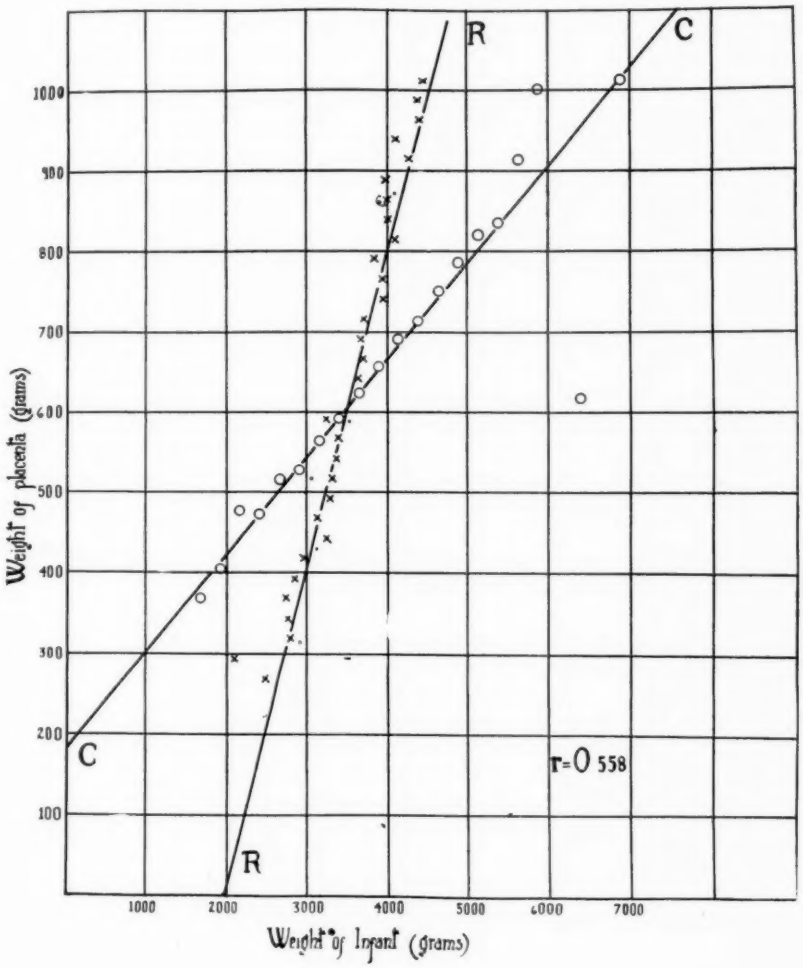
WEIGHT OF PLACENTA (GRAMS)	1500-1749	1750-1999	2000-2249	2250-2499	2500-2749	2750-2999	3000-3249	3250-3499	3500-3749	3750-3999	4000-4249	4250-4499	4500-4749	4750-4999	5000-5249	5250-5499	5500-5749	5750-5999	6000-6249	6250-6499	6500-6749	6750-6999	
1000-1024									1	1	4			1		1		1				1	10
975- 999									1	1	1		1	2	1			1					8
950- 974									1	1	1	3	4		1								11
925- 949									3	1	2		3										9
900- 924									1	3	6		3				1						14
875- 899									3	2		1		1									7
850- 874					1	1	1		3	6	7	4	2	2									27
825- 849								4	3	5	5	5	1			1							24
800- 824								1	9	7	4	2	3	3		1							30
775- 799						2	4	4	5	6	5	4	1	1	1								33
750- 774							6	8	15	18	13	9	7	1	1	1							79
725- 749						3	2	3	9	7	8	5	6			1							44
700- 724				1	2	2	11	26	45	22	18	8	7	1									143
675- 699				1	1	2	8	14	21	16	9	3	3										78
650- 674					4	5	20	21	45	31	19	9	4	3									161
625- 649					4	5	18	20	38	13	13	7	4	3									125
600- 624			2	4	2	17	26	45	65	42	20	13	5							1			242
575- 599			1	1	3	8	21	27	35	23	7	3	3		1								133
550- 574		1	2		10	19	42	47	44	21	7	2	2										197
525- 549			3	2	9	11	27	19	34	16	6												127
500- 524		1	2	5	17	20	46	45	31	11	9	1		1									189
475- 499			2	2	7	11	12	11	13	6	2	1											67
450- 474	1	1	4	3	13	15	29	17	11	5	3												102
425- 449			1	1	3	7	13	12	7	1	1												46
400- 424	2	3	2	6	12	13	13	5	9		3												68
375- 399	1	2		3	3	3	3	2	2	1													20
350- 374	1		1	4	4	6	4	1															21
325- 349	1	1				3		1	1														7
300- 324	2		1	2		3			1	2													11
275- 299	1		1	1																			3
250- 274		2	1			1																	4
	9	11	23	36	95	157	306	333	456	268	173	80	59	19	5	5	1	2		1		1	2040

WEIGHT OF INFANT (GRAMS)

Now let W be the weight of the infant and Z the weight of the placenta (both in grams) in any given instance, and let S_w and S_z be respectively the standard deviations of observed points (W, Z) in a given experience from the corresponding fitted regression line. Furthermore, let D_w and D_z be respectively the weighted standard deviation of means of arrays (rows or columns respectively) from the corresponding regression line. In the experience recorded in Table I, Chart 1, $S_w = 510$, $S_z = 108$; $D_w = 83$; $D_z = 19$.

Chart II

Male Infants Weighing over 1500 grams



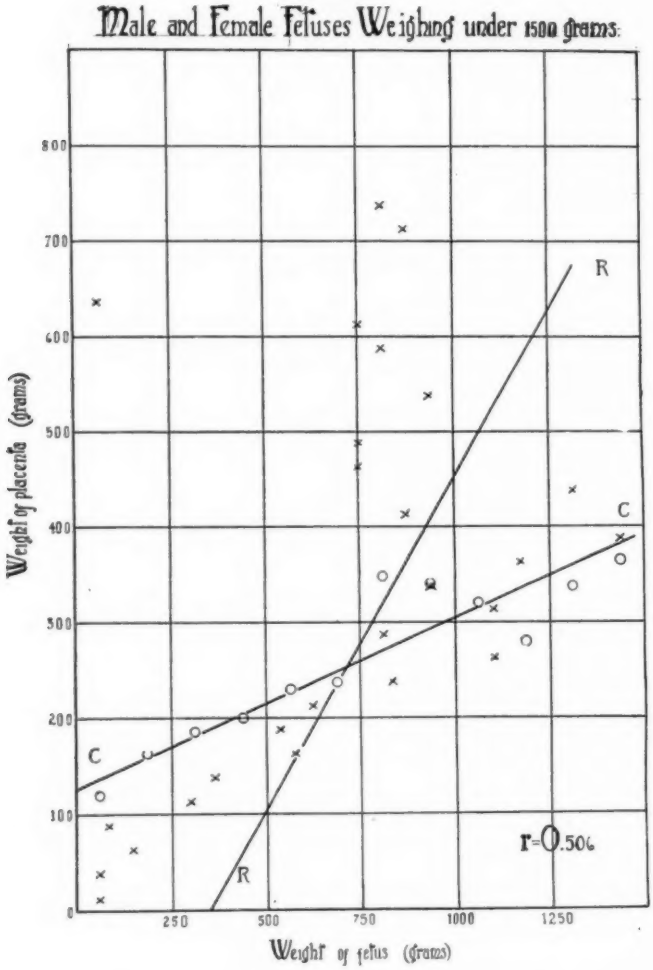
The mean weight of the infant was found to be 3,399 gm. (σ_w = 583), and of the placenta, cord and membranes 597 gm. (σ_z = 12.3).

The ratio of the mean infant weight to the mean placental weight was 5.7.

Table II is a similar correlation table for the males. The class intervals are the same as in Table I. The correlation coefficient is 0.558.

Chart II shows the regression lines plotted for the data of Table II, and the means of the rows and columns. It is evident that the means

Chart III



are well fitted to the regression lines. Here $S_w = 480$; $S_z = 104$; $D_w = 115$; $D_z = 12.3$. The average weight of the normal infant was 3,507 gm. ($\sigma_w = 578$), and that of the placenta was 607 gm. ($\sigma_z = 12.8$). The ratio of the mean newborn infant weight to the mean placental weight was 5.8.

Table III shows the weights of male and female fetuses under 1,500

gm. Here the placental weight class interval is 25 gm., and the fetal weight class interval 125 gm. The correlation coefficient is 0.506.

Chart III shows the regression lines and means. The means deviate much more from the regression lines than is the case in the two preceding instances, but it is reasonable to expect such a greater dispersion as the result of dealing with a smaller number of individuals. Here $S_w = 358$; $S_z = 126$. In general, it can be seen that the ratio of the mean weight of the fetus to the mean weight of the placenta is less than in the previous tables. The mean weight of the fetuses was 712 gm. ($\sigma_w = 414$), and that for the placentas 259 gm. ($\sigma_z = 14.6$). The ratio of the mean fetal weight to the mean placental weight was 2.7.

Torvald Brandt and Keren Sieck (1929) collected some 4,000 instances from Scandinavian births, and gave ratios between the weight of the infant and the weight of the placenta, cord and membranes. In their article they claim that the regressions are what has been called "logarithmic." The justification for this claim, however, is not easy to find. Westermark (1926) presented over 19,000 instances giving

TABLE III. MALE AND FEMALE FETUSES WEIGHING UNDER 1500 GRAMS

WEIGHT OF PLACENTA (GRAMS)	0- 124	125- 249	250- 374	375- 499	500- 624	625- 749	750- 874	875- 999	1000-1124	1125-1249	1250-1374	1375-1499	
725-749							1						1
700-724							1	1					2
675-699													
650-674													
625-649	1												1
600-624					1			1					2
575-599							1						1
550-574													
525-549								1					1
500-524													
475-499					1			1					2
450-474		1									1		2
425-449									1		1	2	4
400-424				1							1		2
375-399												1	1
350-374							1	1	3	2	1	3	11
325-349								2					2
300-324						1		1	2	1	1	1	7
275-299			1		1	1	1	2	1	1			8
250-274						1		2		2	1	1	7
225-249			1	1	1		1	2	1	1	1		9
200-224		1	1	6	2		5		1		1		17
175-199			1	1	3		1						6
150-174	1	2	1	2	3	2		3		1			15
125-149		1	2	1	1								5
100-124	3	1	1	2	2								9
75- 99	3	1											4
50- 74	1	2											3
25- 49	2												2
0- 24	2												2
	13	9	8	14	15	5	12	17	9	8	8	8	126

WEIGHT OF FETUS (GRAMS)

the relation of the weight of the infant to that of the placenta, cord, and membranes. From an inspection of the graph, the fit of the logarithmic regression curves appears to be good, but no evidence of estimate of goodness of fit is given. The regression found in the present experience is at variance with this contention, but it is impossible to discuss this variance without the fundamental data upon which the calculations of these two authors are based.

In contrast to the above, Adair and Thelander (1925) have given all the fundamental data in the form of a correlation table. They have estimated the correlation coefficients (with separate analysis for males and females), but the subject of regression is untouched. This may be due to the fact that the total number of instances cited is only 370. The placenta was weighed without cord or membranes. Adair and Thelander came to the conclusion that a low ratio between the weight of the placenta and infant was found in premature and very small infants; and in agreement with Holland (1922) they reported a low ratio in abnormal cases, especially where toxemia of pregnancy was present in the mother, and a high ratio in postmature and large infants, which agrees with a statement by DeLee. Among the instances reported here of infants weighing between 1,500 and 2000 gm., there are instances in which there is a low ratio, as well as instances in which the ratio is high. Likewise, among the large infants there are found instances in which the ratio is low, as well as those in which the ratio is high.

CONCLUSIONS

The weight of the placenta is not a constant fraction of the weight of the child. The correlation coefficient shows that they influence each other to a large extent, but the fact that the correlation coefficient is not higher shows that other important influences must exist.

A positive correlation is observed in fetuses under 1,500 gm., but the fit of the means to the regression lines is not as good, probably because of the small number of individuals observed.

The mean placental weight and the mean infant weight for the male and female infants differ by an amount which is statistically significant.

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AN ANALYSIS OF 124 CASES OF LOW CERVICAL CESAREAN SECTIONS*

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IN THE years from 1922 to 1929 inclusive, 6,175 women were delivered in the Department of Obstetrics and Gynecology of the Evanston Hospital. During this time cesarean section was done 124 times. We wish to present a brief analysis of this series of cases. These operations, with the exception of 7, were done by the staff of this department of the hospital. Six of these 7 were done by a member of the teaching staff of Rush Medical College in the Department of Obstetrics and Gynecology who has courtesy privileges in the hospital. The seventh was done by a junior member of the surgical department.

During the first year or two of the time covered by this report the low cervical operation was used only in the cases in which a test of labor had occurred, the classical operation being used in the remainder. The difference in the smoothness of the convalescence in the cases in which the two types of operation were used soon impressed itself upon us and the newer operation came to be used with increasing frequency. At present the low cervical operation is routinely used. The gradual change in the frequency of the two operations will be seen in Table I.

Table I

	LOW CERVICAL CESAREANS	CLASSICAL CESAREANS	TOTAL CESAREANS	TOTAL DELIVERIES	PER CENT CESAREAN INCIDENCE
1922	2	9	11	608	1.8
1923	1	3	9	622	1.4
1924	0	10	10	741	1.3
1925	6	12	18	725	2.4
1926	20	9	29	847	3.4
1927	31	5	36	829	4.3
1928	31	8	34	904	3.7
1929	33	1	34	899	3.7
TOTALS	124	57	181	6175	

Total Cesarean Incidence 2.9%
Total Low Cervical Incidence 2.0%
Total Classical Incidence 0.9%

The technic used is essentially that described by DeLee and Beck, which has been described repeatedly, and we have ourselves referred to it in a previous communication. Imbrication is used at present

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only in cases which have been long in labor or in those in which we fear the possible presence of infection. We have not used the uterine pack. We invariably have the gauze packing and the instruments for its application ready in order that it may be used if hemorrhage is difficult to control but in this series it was not used at all.

In cases in which a test of labor has preceded operation, we make use of the vaginal application of mercurochrome as suggested by Mayes.

No member of our service has employed the transverse uterine incision of Kerr and Hendry. The senior author saw this procedure carried out by Dr. Hendry in Monro Kerr's Clinic in Glasgow with excellent results, and we are aware of the favor with which it is regarded by Barton Cooke Hirst and John Cooke Hirst and of the good results following its use by the obstetric staff of the Michael Reese Hospital of Chicago. We have, however, preferred to follow the technic to which we have become accustomed.

Our routine anesthetic has been ethylene although in the past two years all cases operated upon for preeclamptic toxemia have been done under local anesthesia. In toxic cases local anesthesia is preferable, Stander's work having clearly shown that inhalation anesthetics should be avoided.

Fourteen of our patients were operated upon because of a previous abdominal delivery either in our own hands or elsewhere. While the necessity of always doing an abdominal delivery where a previous section has been done has been questioned by some writers, a large volume of opinion favors it. In our service we feel that it is safer to do it. Certainly if the woman has never delivered a baby through the birth canal it seems wiser not to subject the uterine scar to strain. When the danger of abdominal delivery can be reduced to the level which is shown in this report, and similar reports from other services, it does not seem proper to subject the woman to the risk of strain upon the scar. The risk of rupture of the uterine scar in labor occurring after the classical operation is probably about 4 per cent. The risk of rupture after the low cervical operation is probably much less but an accurate evaluation of the risk must probably await reports upon a larger number of cases in which rupture has occurred than are at present available. We have been gratified in observing the small amount of adhesions present in second operations after a previous low cervical section. In those cases in which we have done a second low cervical section we have found scarcely more difficulty in separating the bladder than in primary operation, indeed, in some cases no difference could be noted. The average amount of postoperative adhesions would appear to be less than is found after classical section.

We had 43 cases in which a test of labor preceded operation. The average length of labor preceding operation was twenty-four hours.

While the conception of what constitutes a test of labor varies in different institutions, probably the best definition which has been given is that a test of labor may be considered to have been had, when, after dilatation is complete and the membranes ruptured, pains of good force at intervals of not more than five minutes have occurred for not less than one hour. The majority of our cases have met this definition. In any event labor should go on until an obstetrician of some experience honestly feels that the safety of the mother and child will be greater if abdominal section is done than if some form of vaginal delivery is elected. Twenty-four of our test cases had the membranes ruptured, the average length of time being 11.3 hours.

TABLE II

Total number cases having test labor	43
Average hours in labor	24.0 hours
Number with ruptured membranes	24
Average number hours ruptured	11.3 hours
Number having bag inductions	3

In three cases of severe and increasing toxemia bag induction has been attempted and had failed. A day or two was allowed to elapse after the removal of the bag before the performance of the low cervical section. In one case rather more than the usual amount of tympanites occurred but in all three the result was satisfactory.

In this series of cases only one death occurred, making a mortality rate of 0.8 per cent. The mortality percentage for the entire series is shown in Table III. The case which was lost was that of a woman who had had a previous classical cesarean section in another hospital. She had a history of attacks of syncope and had been under the observation of a well-known internist until shortly before coming to the hospital for delivery. An unusual number of troublesome adhesions were found. Hemorrhage was not excessive. Death occurred about two hours after operation with all the clinical evidence of shock. Autopsy was not permitted.

TABLE III

Total maternal deaths, all cesareans,	4	2.2 per cent
Total maternal deaths, classicals (57),	3	5.2 per cent
Total maternal deaths, low cervicals (124),	1	0.80 per cent
Total fetal mortality, low cervicals,	4	3.2 per cent

One woman developed a pneumonia during convalescence and was seriously ill but recovered. Another elderly primipara with a distinctly flat pelvis, who was operated upon after a test of labor conforming in every particular to the statement noted above, had, a few hours after delivery, serious respiratory difficulty which was called an acute asthmatic attack by the medical consultant. She had a

stormy convalescence, the trouble being entirely thoracic, at no time showing any evidence of any intraabdominal disturbance. Recovery followed. In the great majority of our cases the recovery was smooth and uneventful. Tympanites and vomiting was very much less than had been the rule when the classical operation was routinely done. The reasons for the greatly simplified convalescence in those cases in which the incision is located in the lower, noncontractile segment of the uterus have been discussed so often that we will not again go into them.

We feel that our results for the past eight years show an undoubted advantage in favor of the newer technic. It is true that our experience with the classical operation during the first two years of this time was more unfavorable than during any similar period of time before. Allowance is made for this. Of the three women who died following classical section, one was lost on the thirteenth day after operation from pulmonary embolism after an uneventful convalescence. Another died following section done for central placenta previa, the woman also having a flat pelvis. A third, a primipara of forty-three with several fibroids of varying size in the uterus, and who had a history of myocarditis, died with what appeared to be an acute cardiac dilatation. Postmortem examination of the abdomen only was secured. This showed an entire absence of peritonitis, the uterine wound was in excellent condition and no hemorrhage had occurred. Another case not included in this series was that of a woman eight months pregnant who had had a previous pelvic laparotomy. She developed a mechanical intestinal obstruction, the cause being a peritoneal band. Obstruction was complete. Operation was primarily intended to relieve the obstruction, the uterus being emptied to facilitate this. She was not in good condition when operated upon, the obstruction was difficult to deal with and she died twenty-four hours later. This death should not be charged against the cesarean section as the real cause of death was intestinal obstruction. This case is not included in our mortality list.

The incidence of morbidity will be shown in Table IV.

TABLE IV. MORBIDITY IN LOW CERVICAL CESAREANS

	TOTAL OPERATIONS	TOTAL PATIENTS MORBID		MORBID PATIENTS AVERAGE DAYS MORBID	RANGE DAYS MORBID
		NO.	%		
1922	2	0	0	0.0	0
1923-4	1	1	100	1.0	1
1925	6	2	33	1.0	1
1926	20	10	50	3.5	1 to 7
1927	31	17	55	3.3	1 to 8
1928	31	11	35	3.5	1 to 9
1929	33	18	54	2.5	1 to 11

For the purpose of this report we have considered as morbid any case in which a temperature of 100° F. occurred twice in any twenty-

four hours, the temperature being taken four times daily. Most of the cases showing temperature did so for a day or two only. In two cases wound infection occurred, one of these being the woman referred to above who developed a pneumonia.

TABLE V

PELVIC DEFORMITIES	1922-'25	1926	1927	1928	1929	TOTAL
Contracted pelvis, test labor	2	4	6	4	4	20
Flat pelvis, test labor	0	1	3	0	0	4
Disproportion, test labor	4	5	3	2	5	19
Contracted pelvis, elective	1	2	7	2	2	14
Flat pelvis, elective	0	1	3	3	2	9
	7	13	22	11	13	66
PREVIOUS CESAREAN SECTIONS						
For contracted pelvis	0	0	0	3	1	4
Disproportion, test labor	0	0	0	2	0	2
Placenta previa	0	0	1	0	0	1
For previous stillbirth (difficult labor)	0	1	0	1	2	4
For unknown reasons	0	1	0	2	0	3
	0	2	1	8	3	14
OTHER INDICATIONS						
Preeclamptic toxemia	1	2	1	3	10	17
Previous cervical plastic operation	0	1	2	2	0	5
Obstructing tumor	0	0	3	2	0	5
Repair of 3° laceration	1	0	0	2	0	3
Cardiac decompensation and sterilization indicated	0	1	0	0	3	4
Cervical dystocia	0	0	1	1	0	2
Elderly primipara, breech	0	0	0	0	1	1
Lost first baby in difficult operative delivery	0	1	0	0	0	1
Ablatio placentae	0	0	0	0	1	1
Elderly primipara, psychosis (unengaged large head)	0	0	0	0	1	1
Rectovaginal fistula	0	0	0	0	1	1
Hyperthyroidism	0	0	0	1	0	1
Pulmonary tuberculosis and tuberculous pleuritis	0	0	1	0	0	1
Severe cystitis after two previous labors, seventeen years since last labor	0	0	0	1	0	1
	2	5	8	12	17	44

There is no doubt that cesarean section is done too frequently. There is also no doubt that the mortality the country over is unjustifiably high. Probably the greatest single factor in the production of this high mortality is the use of the operation in cases in which an experienced obstetrician would choose some other form of delivery. The unfortunate results of operations done by the classical method, after lengthy labors and particularly after attempts at delivery had been made from below, are strikingly shown in the figures published by Eardley Holland some years ago. The series here reported were done in a well-equipped and well-organized maternity by a small group of operators, all of whom had had the benefit of obstetric training, and all of whom were able to do the operation properly. This series is presented primarily for the purpose of showing that under such circumstances cesarean section may be done with a high degree

of safety. The risk here shown does not exceed the risk of alternative procedures which may be considered, particularly in cases in which a test of labor has occurred. The injury to the woman is much less than that which may be expected as a result of a difficult forceps or version and the risk to the child is lessened to an even greater degree.

The incidence of operation during the time covered by this report is 1 in 34.5. This is less than the frequency reported from a number of the best obstetric services in the country. The obstetric service of one of the best hospitals in the East recently reported an incidence of 1 in 21.

The increasing safety of this operation under proper circumstances should not lead to its too frequent use. There is a real tendency, even in well-staffed institutions, for too great a proportion of obstetric problems to be solved by abdominal delivery. This should be guarded against, particularly in young women, as the advisability of abdominal delivery in later pregnancies tends to a limitation of reproductivity.

Our experience causes us to believe that the low cervical cesarean section is definitely preferable to the older operation. We have found that both the mortality and the morbidity following the low cervical procedure to be materially lower. The fact that it may be used after a fair test of labor is an additional and weighty argument in its favor. The majority of experienced obstetricians regard the classical operation as an elective procedure, to be done before labor, or at latest, in the early hours of labor. With this view we agree.

The greatest single advantage of the low cervical technic is that it permits the safe use of a test of labor. As 75 to 80 per cent of women with relatively contracted pelves will deliver their babies without abdominal section, it is of great value to possess a procedure which will permit a test and still allow a safe abdominal delivery for the minority who fail to bring the head into the pelvis. In our own experience the number of women with relative contraction who have been delivered vaginally far outnumber those who were subjected to cesarean section after a test of labor.

It is evident, from our own experience and from the experience of other well-organized obstetric services that the mortality of cesarean section in this country generally is too high. It is possible in good surroundings, with trained operators, to obtain a mortality rate for cesarean section which will compare far more favorably with the mortality rates for standard pelvic operations in similar institutions than was the case with the classical operation. The use of cesarean section as a procedure of last resort, after attempts at other forms of delivery, contributes much to the unjustifiably high death rate.

636 CHURCH STREET.

(For discussion, see page 425.)

A NEW RECTAL ETHER ANALGESIA APPARATUS*

By C. O. McCormick, M.D., Indianapolis, Ind.

(Associate, Obstetrical Department, Indiana University School of Medicine)

THIS apparatus was designed primarily to simplify the rectal instillation of the ether-oil solution prescribed by the Gwathmey technic in the conduct of obstetric analgesia. For the past four months it has been employed in the William H. Coleman Hospital for Women, and is thoroughly endorsed by the nursing staff of that institution.

The instrument is cast of the best grade of aluminum. It has a circular base 7 inches in diameter, stands 6½ inches high, and weighs 1 pound and 10 ounces. It is very durably built and except for the rubber parts, will withstand indefinite

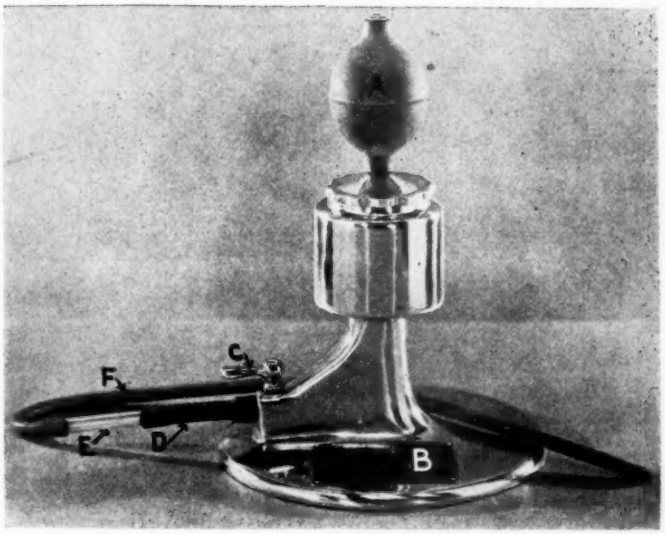

Fig. 1.

usage. Fig. 1 shows the instrument assembled, and Fig. 2 represents it in cross-section. The essential features are lettered, and may be enumerated as follows:

A, DeVilbiss bulb.
B, Metal plate, bearing instructions.
C, Stopcock.
D, ⅜" red rubber connecting tubing (machine made).
E, 3" x ⅜" glass connecting tip.
F, 22 Fr. red rubber catheter.
G, 1¾" screw-cap.
H, 5-ounce chamber.
I, Fixed stratifying device.
J, 1-ounce chamber.

*Manufactured and sold by the William H. Armstrong Co., 233 N. Pennsylvania St., Indianapolis, Indiana.

The directions for the use of the apparatus are concretely stated on the metal plate (*B*), and read:

(Patient on left side, emptied lower bowel, thighs flexed, buttocks at edge of bed.)

1. Close stopcock, pour in one ounce of mineral or olive oil.
2. Pour in ether-oil mixture, screw on cap.
3. Open cock until oil runs through catheter (22 Fr. red rubber).
4. Spread lubricant freely over and about anus.
5. Insert well lubricated catheter 6 to 8 inches into rectum.
6. Remove right glove, open cock, hold catheter in place with left hand.
7. With right hand compress bulb, between pains only, not over 20 to 30 times per minute.
8. Just as the bubble passes through the sight-feed, stop compression and close cock.
9. Remove catheter, make pressure over anus with folded towel for ten to fifteen minutes.

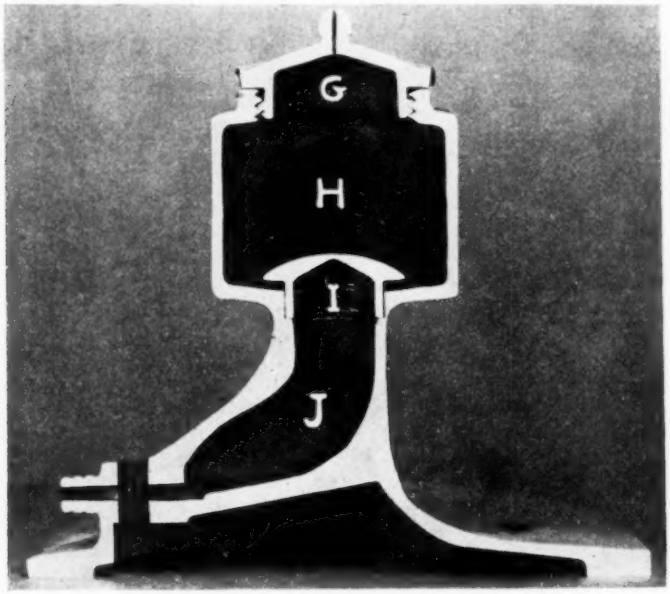

Fig. 2.

SOME HELPS

1. Do not warm either the oil or ether-oil mixture. The absorbability is sufficiently rapid without warming and there is no loss of ether by evaporation.

2. Although vaseline is the popular lubricant, either a tragacanth or a seaweed jelly is preferable, as it does not deteriorate the rubber, and greatly facilitates cleansing the patient and laundering the linen.

3. Do not add an ounce of oil after the instillation of the ether-oil solution. Although included in the Gwathmey technic, it has been found unnecessary.[1]

4. To cleanse, remove catheter and cap, and run "scalding" water through the instrument by placing it beneath a running faucet. May add 1 drachm tincture of green soap. The catheter is the only part requiring sterilization.

[1]Smith, D. L.: J. A. M. A. 90: 1031, 1928.

PRECAUTIONS

1. Do not compress the bulb too rapidly, not over 20 to 30 times per minute. Rapid instillation may invoke spasm of the lower bowel, and render retention difficult.

2. A rectal tube allows the solution to flow too freely, and should not be substituted for the 22 Fr. catheter.

3. Be sure to cease compression the instant the bubble passes the sight-feed, thus avoiding forcing air into the bowel, and preventing immediate or subsequent expulsion of the solution.

4. Administer only between contractions and not during, as retention is thus frequently made impossible.

5. Be certain the catheter is not curled in the rectum, and see that it passes the presenting part if the latter is low, using a gloved finger if necessary.

Compared with the various known methods of instillations, this apparatus affords the following advantages:

1. It eliminates all necessity for assistants, therefore, the general practitioner or student nurse can perform the instillation alone.

2. It is decidedly neater, as there is no spilling or regurgitation.

3. The actual instillation can be readily performed within thirty to forty seconds, that is, within the interval of any two consecutive pains. (The gravity method usually requires 2 to 4 intervals.)

4. Because of the forced instillation and no "pain" pressure interruption, the solution is instilled higher and retention is better.

5. More economical. In addition to dispensing with the "follow-up" ounce of oil (as also recommended by the Lilly method), it prevents the loss of oil and the ether solution incurred by slipping and difficult tube connections. Also, if an institution wishes to furnish its own oil and ether mixture, it can do so at a saving of 60 to 75 per cent.

6. By eliminating assistants, and clumsy administration, it perceptibly adds refinement to the technic.

504 MEDICAL ARTS BLDG.

Terruhn: Leucoplakia and Kraurosis Vulvae. Arch. f. Gynäk. **138:** 318, 1929.

According to the author, leucoplakia is not a disease entity in itself. The condition should be really termed a leucodermia rather than a leucoplakia and considered as a manifestation of the first stage of kraurosis vulvae. The regressive and atrophic changes of the second and third stages of kraurosis vulvae make a "stationary" or permanent leucoplakia an impossibility. It is impossible to have a kraurosis vulvae without a leucodermia, i.e., a loss of pigment but a vitiligo vulvae is possible without the presence of a kraurosis. Such a vitiligo is frequently confused with kraurosis vulvae but there is absolutely no pathologic connection between the two conditions; they must therefore be sharply differentiated. A vitiliginous leucodermia of the vulva is probably due to an irritation of the internal pudendal nerve.

RALPH A. REIS.

Case Reports

DIAGNOSTIC LIPIODOL INJECTION INTO MILK-DUCTS FOLLOWED BY ABSCESS FORMATION*

By Emil Ries, M.D., Chicago, Ill.

UNLOOKED for and undesirable sequelae of the injection of lipiodol into milk-ducts for diagnostic purposes caused the physician who had made the injections to refer his patient to the Post-Graduate Hospital for treatment. The physician also gave the details of the history of the case and permitted the use of the films made for him after the injection.

The patient was thirty-six years old. She had her second child in May, 1928, which was breast-fed for twelve months. In July, 1929, six weeks after weaning her baby, she noticed blood coming out of the right nipple. Shortly afterward

Fig. 1.

she consulted a physician who found a little nodule in the upper outer quadrant of her right breast and expressed some blood from one duct. On July 30, 1929, in order to determine the nature of the tumor and its extent, the doctor injected lipiodol, through a fine ureteral catheter, into the milk-duct from which he had squeezed out the blood.

As the other breast showed some brown discharge from one milk-duct, but no tumor, he also injected that canal with lipiodol.

X-ray examination showed beautifully the extent of the tumor-bearing cavity in the breast filled with lipiodol. It also showed the entire milk-duct and its branches with the contrast fluid. (Fig. 1.)

*Read before the Chicago Gynecological Society, February 21, 1930.

Fig. 2.

Fig. 3.

Fig. 2 shows the left breast after the injection, giving a very perfect picture of the branching duct.

The tumor, a papilloma, was removed by her physician and the wound healed perfectly. Six months afterward there was a very good scar. However, seven weeks after the injection, the woman began to have pain in the nontumorous breast. A painful swelling developed which broke down and the process of abscess formation went on until admission. The abscesses had to be opened and there was a constant discharge of pus for six months. When she came under our observation, the sector of breast involved showed four distinct abscess openings and the entire sector was infiltrated and painful. There was copious discharge of brownish pus requiring frequent dressings.

We performed a conservative operation, resecting only the part of the breast affected by the abscesses. Immediately after the operation we took an x-ray picture of the tissue removed. Fig. 3 shows that the milk-ducts still contained lipiodol.

On microscopic sections nothing was found except inflammatory changes. No carcinoma or tuberculosis was found. The tissue showed an extensive inflammatory infiltration with quite a number of giant cells. It showed no caseation and no proliferation of milk-ducts.

Of course we are unable to say whether the breaking down is due to the injection of lipiodol or not. There may have been an infection of some kind subsequently which caused the breaking down. We have found no way of demonstrating lipiodol in the inflammatory areas on sections.

While the demonstration of the size and shape of the milk-ducts by the lipiodol was perfect, the sequelae may suggest considerable caution in the application of this procedure.

Salmond, Margaret: The Use of Glycerin in Cesarean Section. Lancet 217: 659, 1929.

After the removal of the placenta the uterus retracts quickly on applying glycerin to the uterine cavity. This drug is also recommended because of its value in the presence of infection, particularly in establishing uterine drainage. The report is given with the intention of stimulating control work by others.

H. C. HESSELTINE.

Neuman, H. O.: Histologic Studies Concerning the Sympathicotropic Cells of the Hilus of the Ovary. Arch. f. Gynäk. 136: 550, 1929.

Neuman describes the so-called sympathicotropic cells found in the hilus of the ovary which were first described by Berger. These cells are specific sex cells and have nothing to do with the heterosexual development. They are found in the ovaries of newborn girls, disappear during childhood and again develop during puberty. They undergo a definite hypertrophy and hyperplasia during pregnancy and are more numerous in multiparae than in nulliparae or primiparae. As women approach the menopause these cells gradually decrease in number. The author was unable to study the activities of these cells in relation to the menstrual cycle. He reaches no conclusions as to whether these cells are paraganglion cells or chromaffin cells nor does he as yet arrive at any conclusion as to their specific function.

RALPH A. REIS.

THE ASSOCIATION OF POLYCYTHEMIA WITH OCCLUSION OF THE INFERIOR VENA CAVA

Report of a Case*

By Henry J. Tumen, A.B., M.D., Philadelphia, Pa.

(Assistant in Medicine, Graduate School of Medicine, University of Pennsylvania)

THE opinion of F. Parkes-Weber[1] that polycythemia vera has its cause in an overactivity of the erythroblastic tissue is very widely accepted. There are cases, however, in which a high red cell count is found and in which this high count is evidently secondary to a known excitant of the bone marrow. Such cases are distinguished from true polycythemia by calling them secondary. Very frequently their only difference from an idiopathic case is that their cause is known.

Among the better studied causes of polycythemic reaction are those in which an anoxemia is the excitant. These are, for instance, exposure to the low oxygen tension of high altitudes, congestive heart failure, and, in congenital heart disease, the type which affects the pulmonary circulation.

As a cause of polycythemia an obstructive lesion affecting a large portion of the circulatory bed has been frequently mentioned and a few such cases are reported. Of course, pulmonary fibrosis and congenital heart disease are forms of circulatory obstruction but in these cases the resulting polycythemia can be definitely ascribed to the anoxemia. A case of circulatory obstruction of a different type was reported by Reckzeh.[2] This author cites a case of malignancy of the thymus and lungs with obstruction of the superior vena cava. In this case a polycythemia was early found in the upper half of the body only; later a polycythemia developed in the lower part of the body as well. Reckzeh considered the congestion resulting from obstruction a cause of the increased red cell count. He experimented on dogs and in two animals succeeded in causing a partial occlusion of the great veins close to the heart. In these two dogs a polycythemia developed. However, from Reckzeh's report it seems that the pulmonary veins were also ligated so that pulmonary stasis may have been a factor. Lommel[3] considered that chronic stasis in a large circulatory area can call forth a polycythemic reaction, especially if this occurs in the portal circulation. In 1912 Abrahamson[4] reported a case of obstruction of the superior vena cava by sarcoma with a polycythemia of the upper half of the body. Other cases of vascular obstruction associated with polycythemia are those of Van der Weyde and Van Ijzeren[5] (thrombosis of the portal vein); Chauffard and Troissier[6] (splenic and portal thrombo-

*From the Service of Dr. Wm. R. Nicholson, Graduate Hospital, Philadelphia, Pa. Read at a meeting of the Philadelphia Obstetrical Society, March 6, 1930.

phlebitis); Monro and Teacher[7] (old portal thrombosis); Münzer[8] (probably an obstruction of the superior vena cava by pressure from a substernal goiter or collection of fat) and Hume and Shaw[9] (thrombosis of the splenic artery and vein). Parkes-Weber[10] also reported a case of erythromelalgia and polycythemia which later developed a very large abdominal tumor, probably ovarian.

Both Parkes-Weber[1] and Gaisböck[11] believe that a condition of blood stasis affecting a large part of the body can cause a polycythemia. Gaisböck, however, is of the opinion that the thrombosis found at autopsy in many cases is a result of the polycythemia rather than a cause of the disease.

In view of the scarcity of cases in which circulatory obstruction other than cardiopulmonary is associated with polycythemia the following case is reported:

M. W., a negress, thirty-six years of age, was admitted to the Graduate Hospital October 29, 1929 on the service of Dr. Wm. R. Nicholson. She complained chiefly of vaginal bleeding. She had had her menses in August and in September, and they had seemed normal except for a slight decrease. A normal period occurred early in October and she began to bleed again on October 26, three days before admission.

Abdominal swelling was noticed about five months before admission. This swelling had gradually increased. Dilatation of the veins of the legs was noticed with the onset of the abdominal swelling. Beginning three weeks before admission almost daily attacks of severe lower abdominal pain had occurred. Since she had had nausea and vomiting and some swelling of the breasts about nine months before admission and had recently felt what she thought were fetal movements, the patient was sure that she was pregnant. There were no other complaints save increased urination.

When the high red cell count was noted, the patient was questioned about the presence of headaches, dizziness, and tinnitus but had noticed none of these. She also denied the use of any drugs that occasionally cause polycythemia.

On physical examination there was no cyanosis but the mucous membrane of the mouth and the nail beds was engorged. The sclerae were injected; the teeth were poor; the tonsils were diseased and there was no lymphatic enlargement. There was a slight fibrosis at the right apex. The heart was entirely normal; the blood pressure was 132/106. The abdomen contained a centrally placed tumor apparently arising from the pelvis and reaching almost to the xyphoid. It felt cystic. No fetal parts could be felt or heart sounds heard. A fluid wave was present. Neither the liver nor the spleen was enlarged. There were slight pretibial edema and swelling of the veins of the legs. The veins of the upper thigh, especially the superficial circumflex iliacs were dilated. The vaginal examination showed displacement of the cervix upward and a large tumor mass, probably arising from the uterus.

A diagnosis of large uterine fibroid was made.

The urine was negative on repeated examinations. The red blood cells varied from 8,010,000 to 8,600,000 per c.mm. No abnormal red cells were found and the reticulocytes were 0.1 per cent. The hemoglobin was 123 per cent to 140 per cent; the white cells 3,650 to 6,350 with normal differential counts. The platelets were 208,000. Blood volume studies were not done. The coagulation time was four minutes and bleeding time one and three-quarters minutes. The Wassermann and Kahn tests were positive. The blood chemistry was normal.

An eyeground examination showed marked dilatation of the retinal veins. X-ray

studies showed a large tumor mass in the lower abdomen with no evidence of pregnancy. The lungs showed signs of an old bronchitis.

At operation the uterus and general tumor mass could not be differentiated. Adhesions were found involving the parietal peritoneum universally, so widespread and dense that even the round ligaments could not be appreciated. The ovaries were also buried by dense adhesions. The upper pole of the tumor was adherent to the diaphragm by a band fully three fingers broad. The adhesions were very friable and bled most profusely. Any attempt at removal was out of the question and therefore to control oozing a pack was inserted and the abdomen closed. The patient, however, lost so much blood that she was practically exsanguinated and died about three hours after leaving the operating room.

Permission for autopsy was not given but despite this the operative wound was reopened. An immense degenerated fibroid was found. It was adherent to the abdominal walls anteriorly, laterally, and posteriorly. Pressure was exerted on the inferior vena cava so as to partially occlude it. The vein was not opened.

In 1911 Pleasants[17] published a very comprehensive monograph on obstruction of the inferior vena cava. This is an analysis of 314 cases in all, including 18 cases from the Johns Hopkins records. Unfortunately there is no record in any of these cases of a blood count after the onset of the obstruction. Pleasants emphasizes the fact that obstruction of the inferior vena cava can occur, even suddenly, as in surgical ligation, entirely without symptoms; superficial collateral circulation and edema may be entirely absent.

Since the appearance of Pleasants' article, many case reports of inferior vena cava thrombosis have appeared and surgical ligation of this vein is being done for various indications. Most of the reports of ligations comment on the good health of the patients following operation with the presence of at most transient signs of circulatory obstruction. The reports on inferior vena cava thrombosis, notably that of Simpson[12] who discussed the 78 cases of tumor thrombosis reported to the date of his publication, comment on the infrequency of antemortem diagnosis due to an absence of signs. These points are mentioned to show that a complete obstruction of the vena cava is by no means incompatible with health and compensated circulation. Weiss[14] reported a case of thrombosis of the inferior vena cava diagnosed during life, and in a personal communication informs us that after the onset of the thrombosis his patient developed a red cell count of 5,750,000. It is highly probable that in most of the cases of inferior vena cava thrombosis no polycythemia developed. Many of the cases of surgical ligation, however, were not studied hematologically. Such studies might have produced a few more individuals who reacted with a polycythemia to such a circulatory disturbance.

In the case here reported one can only speculate as to the relationship between the vena cava occlusion and the polycythemia. They might have been coincidental. One is tempted, however, to consider the circulatory obstruction as a cause of the blood picture. F. Parkes-Weber, Gaisböck, Harrop,[15] and in fact most of the writers who dis-

cuss the cause of polycythemia seriously consider blood stasis as a possible cause of the disease. Parkes-Weber, in fact, says that the principal rival to his theory that polycythemia is entirely due to hyperplasia of the bone marrow is the theory that stasis may cause, at least in some individuals, a polycythemic reaction. Just how this reaction is caused, however, is not clear. It might be mechanical congestion, or a distortion of the normal blood distribution. Lommel[3] and Münzer[8] are subscribers to the theory that in marked circulatory obstruction the hemoglobin undergoes some change which interferes with its oxygen-carrying capacity. They believe that the resulting anoxemia causes an overstimulation of the bone marrow. This idea has received some confirmation by the work of Lundsgaard[16] who found a lowered coefficient of oxygen utilization in polycythemia and that of Harrop[17] and Harrop and Heath[18] who found an increased arterial unsaturation and diminution in the rate of pulmonary gas diffusion in the disease.

SUMMARY

1. A case is reported of polycythemia associated with partial occlusion of the inferior vena cava.

2. The suggestion is made that in this case the venous obstruction is responsible for the blood picture.

3. It is suggested that in the future any cases of inferior vena cava ligation receive careful hematologic studies including blood volume determination.

I wish to acknowledge my indebtedness to Dr. William R. Nicholson for his kindness in permitting me to report this case.

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2022 Spruce Street.

(For discussion, see page 429.)

AN UNUSUAL FETAL MONSTROSITY, WITH INTERESTING PROBELM IN DELIVERY*

By Clifford B. Lull, M.D., Philadelphia, Pa.

THIS case is being reported because of the rather unusual type of monstrosity, and because of the problem presented in delivery.

Patient, A. C., aged twenty-seven years, primigravida, whose last menstrual period was April 5, 1929, was admitted to the Delaware County Hospital on January 5, 1930 about one week before the estimated date of delivery. The family history was negative with no twins on either side of the family. She had the usual diseases of childhood. Her tonsils and adenoids were removed at the age of five years and there was no other serious illness or operation. Her condition during pregnancy had been satisfactory. She went into labor at 2 A.M., January 5, with fairly severe pains from the very beginning. Examination at 5 A.M., at which time she was having five-minute pains lasting one minute, showed partial effacement of the cervix with one finger dilatation. The heart sounds were heard in the left lower quadrant, about 130 in rate. At 6 A.M. she had a 1/6 gr. of morphia and 1/200 gr. of scopolamine. She obtained no relief from this medication and labor continued during the day with strong contractions occurring every three to five minutes. Examination at 6 P.M. showed her to be completely effaced, 3 fingers dilated and membranes ruptured. At 9 P.M. she was completely effaced with the child presenting in a L.O.A. position. At 9:30 P.M. her physician, Dr. Dick, delivered by low forceps, a living male child weighing 4 pounds and 5 ounces. Dr. Dick had suspected twin pregnancy, because of the size of the abdomen but could never hear but one heart sound. Immediately after delivery of the child it was obvious that another fetus was still in the uterus. Examination showed it to be a footling presentation. The anesthetic was withdrawn and she was allowed to make an effort to expel the other twin. After waiting some time, during which the patient bled slightly, she was again anesthetized and an attempt was made to extract the second child. At this time the diagnosis of fetal monstrosity was made, but the attempts to deliver were unsuccessful. Again the anesthetic was withdrawn and I was asked to see the patient. On examination I found a woman coming out from ether anesthesia in fairly good general condition, considering a not so long, but rather hard labor and a rather prolonged anesthetic. Her pulse was 110 but of good volume and regular. The fundus of the uterus was 3 fingerbreadths above the umbilicus and was very firmly contracted. No heart sounds were heard. Vaginal examination showed a very slight laceration of the pelvic floor. There was protruding into the vagina two very small and ill-formed feet, with the cervix tightly contracted around the extremities just above the ankles. Moderate bleeding from the uterus was present. So much traction had been made upon the feet that both were torn off at this time. It was impossible to get more than two fingers by the tightly contracted cervical canal. From what could be felt, I was impressed with the enormous size of the thighs, in comparison to the very small feet and legs, and the evident size of the remainder of the fetus, from the size of the uterus. The patient was again anesthetized, and another attempt made by myself, to release the contraction ring and effect delivery by placing a traction sling around the extremities. We thought at this time we were dealing with a hydrocephalic monster. Under deep anesthesia the uterus did not relax at all, and the contraction ring remained intact. During this time there was moderate

*Presented at a meeting of the Philadelphia Obstetrical Society, March 6, 1930.

bleeding from the uterus, and after several unsuccessful attempts, with various methods of traction it was given up.

The picture now was that of a patient who had a very severe labor with ruptured membranes for several hours; four vaginal examinations before delivery of the first child; three rather deep and prolonged anesthesias; forceps delivery of the first child and two unsuccessful attempts at delivery of second child. In addition the uterus was tetanically contracted over the body of the second child. There was a contraction ring around the extremities of the child in utero with a moderate amount of bleeding from the uterus. A rather interesting if not complicated, obstetric situation.

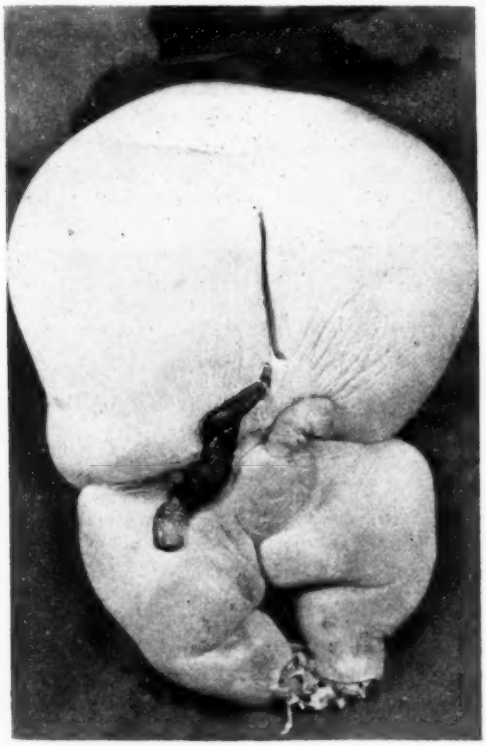

Fig. 1.

It was decided to allow the patient to come completely out of the anesthesia, to have her typed for blood transfusion, and the patient and operating room gotten ready for abdominal delivery. If the bleeding persisted and the uterus would make no attempt at rhythmic contractions, abdominal delivery would have to be done. During the time necessary for these preparations the patient reacted quickly from the anesthesia and screamed continuously because of constant agonizing pain in the abdomen. The uterus remained in a state of tetanic contraction and bleeding persisted. Pulse rate increased and the pain became so severe that morphine with atropine and digitalis was given hypodermatically.

At 11:45 P.M. transfusion was started and she received 500 c.c. of blood intravenously by the citrate method. At the same time operation was performed under ether anesthesia. A suprapubic midline incision was made and the uterus eventrated. After packing off carefully, the uterus was incised by a transverse

fundal incision of Fritsch, and the fetal monster removed, with the placenta and membranes. The uterine incision was held closed by traction forceps, and the uterus amputated supravaginally. Both ovaries were left. The stump was carefully covered with peritoneum. A cigarette drain was carried well into the pelvis and the abdomen closed in the usual manner.

The operation was done as quickly as possible and the patient returned to her room with a temperature of 99° F. and a pulse rate of 128. Her convalescence was uneventful. There was very little distention and the temperature and pulse remained good at all times. The drain was removed at the end of forty-eight hours, skin clips on the sixth day, the wound healed by primary union except at the insertion of the drain which was entirely healed by the ninth day. She and the surviving child were discharged on the nineteenth day, both in good condition, and have remained so to this time.

The fetus weighed 6 pounds, and should be described as a homogenous mass of tissue, with no head or arms, but two lower extremities, from which the feet had been removed. X-ray, and actual photographs were made, after which the mass was dissected. This showed that there was no heart, lungs, or liver. The intestinal tract consisted of several feet of cord-like process in which there was a milky fluid. There was one kidney present with ureter. The bladder was normal and there was a well-formed, external genitalia of a male child. The portion of the head and cervical spinal column and portion of the upper extremities were entirely absent as well as the brain and upper spinal cord. There was of course, only one placenta.

This monstrosity is quite typical according to the classification of Birnbaum and Blacker, of acardiacus-acephalus, which is the most frequent type of this variety of abnormality. It is found almost always in homologous uniovular twins with a common placenta. The one twin is, as a rule, well developed. There are several theories as to the cause of this peculiar formation. The one most generally accepted is that there occurs an extensive anastomosis of the circulatory systems of the two children. The blood pressure predominates in the circulatory system of the one twin in such a way that the heart of this, the stronger twin, carries on the circulation of both, and the blood stream in the other twin is reversed. As a result there is either a complete atrophy or a failure of development of the heart, lungs, and trunk of the mal-formed twin. It is nourished by the normally developed one.

Fareuffi was able to collect 108 cases of acardiaci-acephali from the literature. Hirst and Piersol's atlas of human monstrosities describes this variety at length and notes several instances of difficulty in the delivery. Both of these books stress the point that difficulty in delivery seems to be quite common, but all their cases that are on record were delivered per vagina, after amputation of the extremities, by placing a blunt hook through the abdomen and around the pubic arch giving a firm method of traction.

In this case the tetanically contracting uterus and the contraction ring at the internal os made this method of delivery impossible. A low cervical section was deemed inadvisable because of the suspected enormous size of the after-coming head, and from the amount of handling which the patient had, it was thought inadvisable to allow the uterus to remain in situ.

1731 Pine Street.

COMPLETE INVERSION AND PROLAPSE OF THE UTERUS. ADHERENT PLACENTA ATTACHED. SHOCK, REPOSITION, RECOVERY

By John Joseph Gill, M.D., F.A.C.S., Chicago, Ill.
(From the Wesley Memorial Hospital)

MRS. T., a primipara, American born of Italian parentage, in good general health, robust, weight 150 pounds. Her last menstrual period appeared on September 11, 1928. I first saw her February 21, 1929. The pregnancy ran a normal course except for a leucorrhea throughout the term and slight edema for the last trimester.

She was admitted to Wesley Memorial Hospital on June 22, 1929, at 10 A.M., having been in labor for six hours. The bag of waters ruptured spontaneously at 4 P.M., at which time dilatation was complete, with the occiput to the left and fixed in a deep transverse arrest.

After two hours of hard labor no progress had occurred so, under ether anesthesia, the axis-traction forceps were applied and an easy delivery of a 7½ pound baby girl was accomplished. After waiting for fifteen minutes, my assistant reached for the fundus to determine its firmness, but was unable to find it. The patient, coming from under the ether, was straining forcibly and a mass appeared at the vulva; another retching and the completely inverted uterus wholly enveloped in the placenta was projected between the thighs. No line of demarcation between the uterus and placenta could be found, so a central opening was made and the large one pound six ounce placenta was peeled off toward its periphery with only moderate bleeding. The patient was in shock; she became chalky white, the pulse reached 140 and respirations 25 per minute. The uterus was quickly and easily reposited over my coned hand; it immediately formed a central contracting ring about my hand, which was held in the uterus and gradually withdrawn as gauze packing was inserted. The cervix and perineum presented no tears. One c.c. of pituitrin was administered. The gauze packing was removed from the uterus on the following morning. For one week, the temperature ranged around 100° F. On the tenth day, mother and child in good condition left the hospital.

5708 Harper Avenue.

Society Transactions

CHICAGO GYNECOLOGICAL SOCIETY

STATED MEETING, FEBRUARY 21, 1930

DR. W. C. DANFORTH AND DR. ROBERT M. GRIER presented a paper entitled **An Analysis of 124 Low Cervical Cesarean Sections.** (For original article see page 405.)

DISCUSSION

DR. JOSEPH L. BAER.—I am in complete accord with everything in this paper except the definition of test of labor; namely, complete effacement and dilatation of the cervix with one hour of five-minute pains before cesarean section is undertaken. There are many patients in whom the experienced operator will decide that the woman should be delivered abdominally when dilatation is far from complete. I am sure the essayist must modify this rigid prerequisite in many instances, justifying the exceptions by the urgency of the specific case.

I have a few statistics of cesarean section in the Michael Reese Hospital in the past twenty months. There were 2542 deliveries and in that number there were 100 cesarean sections, which is approximately 4 per cent. Danforth and Grier showed 3.7 per cent. In our series, which represents the work of our obstetric staff, all were of the cervical type except two which were Porro operations. The routine is almost uniform with only slight variations in technic. The type of anesthesia is a choice between local and ethylene-oxygen. My chief interest in connection with cesarean section is the indication. For that reason I will run through the indications which were accepted by our groups as justifiable in our 100 cases. The largest number was dystocia and disproportion, 29; toxemia, 18; contracted pelves, 13; organic heart disease, 8; placenta previa, 8; previous sections, 7; premature separation of the placenta, 4; breech, 5; miscellaneous, 8. In a series like this no one may say that in those 29 every patient was a bona fide dystocia disproportion and that section was exactly the procedure indicated in that patient. We believe that our combined judgment has been correct, but after all, that could be open to criticism, the same thing with the toxemia group. Here were 18 delivered by section in various degrees of toxemia, eclamptic or preeclamptic. Of the miscellaneous group, two were influenza-pneumonias, one of whom died. That brings me to the mortality in our series.

The operative mortality could very properly be set as one per cent. In this patient, operated upon for premature separation, there was some oozing and the doctor thought he could control it with packing. He unfortunately could not tell that it was the type of uterus which should be removed. The patient died on the table. Of the two influenza-pneumonias, one made a good recovery; the other died thirty minutes after admission. A section was done in an effort to save the baby. If that is charged to our series, we have a mortality of two per cent. If not, then we have one death in 99, which is approximately one per cent.

The technic which Danforth described for the low cervical section is that which we employ. Some of us used the Monro Kerr incision in the low cervical segment. I liked it very much but Lackner recently discovered in a repeat section that the transverse scar showed quite a thinning out. He felt if this woman had been al-

lowed to labor it would have ruptured. So I have not done one in many months. I am now using the median vertical incision.

DR. A. G. GABRIELIANZ.—There was a very interesting summary recently given of the work in Moscow. Of 309,000 deliveries in the period from 1921 to 1927, there were 743 cases of abdominal cesarean sections. Of the 309,000 there were 106 cases of eclampsia. Danforth's statistics show practically the same amount of eclampsia, 17 cases in 60,000 deliveries. During 1921 in Moscow there were 30,000 deliveries in which ten cesarean sections were performed. Due to activity of the younger generation of Russian physicians, there were 233 cesarean sections in 1927 out of 53,000 deliveries. As to the type of cesarean section, the classical and low cervical and transperitoneal cervical sections were used.

Regarding the morbidity, Danforth pointed out that this was lower in low section than in the classical. Moscow had less in the classical and much more in the low cervical. The morbidity is always less in the classical cesarean section. Seventy-one cases of transperitoneal cervical cesarean sections resulted in thirty-one cases of morbidity with two deaths; one from thrombosis of the pulmonary artery, the other from eclampsia in the presence of a goiter and syphilis of the brain.

The classical cesarean section resulted in 4.4 per cent mortality from sepsis and in the low cervical 3.3 per cent.

There were 422 cases of contracted pelvis; 127 cases of placenta previa; 106 cases of eclampsia and 88 cases based on other indications.

DR. D. S. HILLIS.—This is a most creditable report from a conservative hospital both from the standpoint of the number of sections done and from the standpoint of results. I am a little surprised, however, that the writer recommends the test of labor to be carried to the point of complete dilatation of the cervix and rupture of the membranes. I think this may be justifiable in a clinic where most of the work is done by a few men with the best technic. Such a method, in my opinion, if adopted throughout the country, would lead to more late cesarean sections than would be good for the mortality tables. The future of an early determination in labor as to whether an abdominal delivery is needed lies in a development of the impression method of the head which, in most cases, permits this diagnosis to be made before it is too late to deliver the case safely by the abdominal route and a considerable time before the cervix is completely dilated and the bag of waters ruptured. With regard to adhesions between the bladder and the anterior wall of the uterus, my experience has not been so favorable as that reported. We have found a number of cases which at second operation showed no peritoneal adhesions but with the bladder so tightly adherent to the uterus that it could not be stripped down far enough to confine the incision to the lower uterine segment. Perhaps half the cases, however, with no temperature in the puerperium showed no adherence of the bladder and the second operation was done as easily as the first. When there is fever in the puerperium after a low section the integrity of the scar may well be doubted. In two cases with stormy convalescence at the County Hospital it was found at the next operation that there was nothing but peritoneum between the cavity of the uterus and the general peritoneal cavity.

DR. RUDOLPH W. HOLMES.—Drs. Danforth and Grier have had a remarkable success with their low cervical cesarean sections at the Evanston Hospital; it is unfair to compare statistics of the present time with those of the past, even of very recent years. Progress in this operation has gone on with leaps and bounds. Whitridge Williams has declared that the line of demarcation between the "school" period of cesarean section and the application of sound principles was 1910, but every factor which influences the safety of the operation has been immeasurably

bettered, even during these last ten years. Edward Reynolds, in 1907, presented a paper before this Society showing the great advantage of primary over secondary cesarean sections; he has been credited with being the father of the principle that the only safe time for a section was before labor.

I feel there may be no question but that the postoperative reaction discomforts are less following low cervical sections in comparison to the classic, but, at times, I have had classic sections on women who had little or no postoperative discomfort. In one woman, on whom I did two sections, there was little or no discomfort, so she refused to remain in bed the allotted time. From the day of operation she wandered about the ward.

I reported 92 classic sections in 1922. I analyzed them in this manner: (a) those before labor; (b) those in labor; (c) those in labor with membranes ruptured. Tables were made of the high and low temperatures and high and low pulse rates for ten days, averages were made and from these, average graphs were made. It was clearly evident that there was comparatively little difference between the pictures in these graphs of those not in labor and those who were in labor, but there was a markedly increased postoperative thermal reaction in those women whose membranes had been ruptured for a period, even for a short time.

After reading my paper one of the audience told me I would not have had such a thermal curve if I had used the low cervical section on all my women, and he is identified with some points which have enormously improved the technic of the operation. He had just before reported a series of low sections. I took the seven cases of his series which had been longest in labor and with the longest period with membranes ruptured, treated them in the manner described above and took my seven worst cases of comparable type. When the graphs were produced, my seven cases showed the low cervicals to be infinitely worse as regards the height of the thermal curves, and the duration of the fever. When I sent this graph to him his comment, in reply, was: "You forget that there is far more tissue traumatism in a low cervical section than in a classic."

My whole contention is this, there is less peritoneal reaction after a low cervical than a classic, therefore the postoperative disturbances are less than in a classic section. As to the relative safety of the two, this is still a moot question. The classic has one advantage certainly in that it takes less time. The one way to prove the problem is for individual operators to take alternate cases without any selection, and do one series of low cervicals and the other by classic technic. I believe the results would be equally favorable.

DR. F. H. FALLS read a paper on the **Observations on the Use of Local Anesthesia in Gynecologic Operations.** (For original article see page 310.)

DISCUSSION

DR. CAREY CULBERTSON.—Dr. Falls has frankly said that he is offering these observations as one doing gynecologic work and not using local anesthesia as a routine procedure.

In taking up the discussion of this subject, I offer my remarks in exactly the same way. As a matter of fact, my observations on local anesthesia are those of one who does not use it on every occasion or make a fetish of it or try to make use of it to the exclusion of other methods. My experience with local infiltration anesthesia began years ago when Webster started to do cesarean sections by this method. Prior to that he had done an occasional case in which general anesthesia was contraindicated, an occasional laparotomy or an occasional low or plastic operation. But when he started to do cesarean sections under local anesthesia, it worked so well that he carried it out in a long series of cases already reported.

In my own experience, I have used local anesthesia, preceding the infiltration with scopolamine and morphine, using it first in cases in which general anesthesia was contraindicated, but extending indications until confidence was gained, until now it is often a method of choice. Basic technical principles which Dr. Falls has laid down are those which we have followed for years, using plenty of novocaine solution, one-half of one per cent or even one per cent. I think it helps to have the solution stained lightly with methylene blue, thus showing in the tissues definitely the extent of infiltration. In lower plastics particularly, it is helpful to add ten drops of a 1:2000 adrenalin to the ounce of novocaine solution. The important thing is to use plenty of it and to infiltrate extensively and widely beyond the area that is actually to be denuded, for instance, in lower plastic operations. One's assistants should be constantly coached not to jerk or pull unevenly, but to make steady, gentle traction. Dr. Falls emphasized that the tissues must be handled gently.

I have probably not used local anesthesia as often in obstetrics as I did formerly since we have had ethylene gas. We no longer perform cesarean sections under local anesthesia. I have not used it in episiotomy for the same reason but when it comes to gynecologic work, especially lower plastics and vaginal hysterectomy, there are no other surgical procedures, I think, which lend themselves better to local infiltration anesthesia. I have had some experience with it in other work.

I have a very definite impression that our best results are with elderly women rather than the younger. Elderly women with small doses of scopolamine and morphine and a liberal infiltration of novocaine many times do not even know that they have been to the operating room. They offer no resistance at all at the time of operation. Convalescence is certainly simplified and I do not anticipate postoperative complications. Where one operates for intestinal obstruction, colostomy or jejunostomy, or the occasional interference for some other postoperative complication, local anesthesia is admirably indicated. I have had the same experience that Falls outlined in dilatation of the cervix and exploration of the uterus, with wide infiltration of the broad ligaments. Exploration of the corpus sometimes is painful. In perineorrhaphy one has to infiltrate widely also, especially when opening the triangular fascia for muscle approximation, a procedure which I favor. Unless the paravaginal tissues are well saturated this is apt to be painful.

DR. JOSEPH L. BAER.—Having been at Michael Reese Hospital since 1904, I saw some of the early work in local anesthesia which Dr. L. A. Greensfelder had introduced when he returned from Europe with the "Schleich mixture." From that time on, in the surgical wards, infiltration anesthesia has had vogue until today. In the last few years we have taken up spinal anesthesia. I like this particularly for gynecologic work. We find the operative field is so completely exposed, the abdominal musculature being completely relaxed and the bowel collapsed, that it seems to be the method of choice. In selecting cases for infiltration anesthesia, we invariably think of cardiacs and nephritics. Here spinal anesthesia may be just as useful.

DR. J. P. GREENHILL.—At the Chicago Lying-in Hospital local anesthesia was employed in 55.1 per cent of the 874 cervical cesarean sections performed from July, 1915, to July, 1929. During the last year 92 per cent of all the cesarean sections were performed entirely under direct infiltration anesthesia. The latter rather than spinal anesthesia is preferred because it is safer and has given excellent results. The total mortality for the 874 operations was 1.26 per cent and this low mortality at least in part is attributed to the use of local anesthesia. There were only two deaths from pneumonia in this large series and both occurred after the use of ether. Local anesthesia has been found very helpful in gyne-

cologic work also, especially for plastic operations. In my experience direct infiltration with novocaine solution makes dissection of the tissues an easy task.

DR. H. O. JONES.—It seems to me that before deduction can be arrived at a comparison of the mortality and morbidity should be made under the different types of anesthesia. In our service we never use spinal or local anesthesia. We are willing to compare our mortality and morbidity under ethylene-oxygen and ether anesthesia with that obtained from either spinal or local anesthesia. Except in a very few selective cases no spinal anesthesia is used and local anesthesia has not been used at all.

DR. FALLS (closing).—I should have said that we use ten drops of 1:1000 adrenalin to the ounce. We infiltrate the sheath of the rectus and the peritoneum. Dr. Culbertson brought out an important point concerning elderly women. They are especially well adapted to the method. We have seen them sleep during a procidentia operation.

Concerning the question of its use in episiotomies, we have used it not so much to reduce pain when the incision is made because most of our patients get ether or gas, while the head is coming down, but to have its effects during the repair of the episiotomy when we have discontinued the ether and gas. We have noticed in perineorrhaphies as Culbertson also mentioned, that there is no question but that it takes more novocaine solution than it does in anterior colporrhaphy. Anterior colporrhaphy requires very little to completely anesthetize the area. In order to do a perineorrhaphy an additional injection into the muscle is often necessary.

I have not mentioned spinal anesthesia in the paper because I do not use it very much. This is a discussion on local anesthesia.

It is a study of what happens when you use local anesthesia for various types of gynecologic operations, including the ordinary major abdominal operations with adhesions, which is the factor I was most interested in. Cesarean section should not be done under local anesthesia, unless you have a contraindication for general anesthesia. I see no reason for subjecting the patient to the psychic strain of local anesthesia needlessly. The question as to whether it is ever necessary, as Dr. Jones brought out, is a personal one. He is satisfied with ethylene and can do anything he wants with it. I feel that is true in the great majority of cases, but there is an occasional case where I feel that local anesthesia is safer. One should understand how to use it and have considerable experience with the method so that one will not be handicapped in using it on the case in which it is especially indicated.

PHILADELPHIA OBSTETRICAL SOCIETY

STATED MEETING, MARCH 6, 1930

DR. CLIFFORD B. LULL described a **Fetal Monstrosity** which presented an interesting problem in delivery. (See page 421.)

DR. H. J. TUMEN read a paper (by invitation) entitled **The Association of Polycythemia with Occlusion of the Inferior Vena Cava.** (For original article see page 417.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—The question of secondary polycythemia as the result of the obstruction of the vena cava was an interesting speculation, but

one that had not been definitely proved. If this be true, we must regard all cases of polycythemia as primary until we find them otherwise. We know that hemorrhage such as that which occurred in Dr. Nicholson's case is unavoidable. We also know that irradiation of the long bones and spleen within the course of a few months controls polycythemia for a period. Therefore the question arises whether it would not have been preferable in such a case, where faced with a probability of hemorrhage, to have used preliminary irradiation as a preferable procedure.

DR. EDWARD STEINFIELD.—It must be understood that the question of primary polycythemia in this case is not under discussion. It was rather one of those secondary cases which are sometimes referred to as erythremoid reactions. In the primary type of polycythemia there is a very definite entity perfectly distinguished from secondary type. There is noted splenomegaly and some difficulty in the lack of normal blood destruction or more likely, excessive blood regeneration. In any event there is splenomegaly, extremely high red cell counts (10,000,000 to 12,000,000 or higher), increased reticulocytes, leucocytes and increase in hemoglobin counts. In the secondary cases there is simply the polycythemia. There is no increase of young red blood cells, nor any unusual disturbance in blood destruction, and one usually finds some discoverable cause, such as cardiac, pulmonary, or mediastinal conditions. This particular case under discussion belonged to the secondary type, and there was some congestion in the branches of the superior vena cava by way of collateral circulation from the inferior vena cava.

The importance to the surgeon in this type of case lies in the possibility of hemorrhage due to engorged venous circulation in the operative area. In addition the presence of a count above normal may give a false sense of security. There is also a possibility that the presence of polycythemia associated with an abdominal tumor may be of help in an estimation of the degree of posterior attachment of the mass.

DR. WILLIAM R. NICHOLSON.—This case was one of a very large fibroid which had been growing rapidly and was mechanically becoming incompatible with life. Upon operation the tumor was found to be universally adherent. The whole abdomen from the pelvic floor to two fingers above the navel was filled with the fibroid mass which was degenerated and universally adherent to the parietal peritoneum of the anterior and posterior abdominal walls, and also having wide thick adhesions to the diaphragm at its upper pole. An attempt was made to separate the adhesions with the hope that the anterior abdominal wall adhesions were simply local and that after these had been separated it might be possible to deliver the tumor. Hemorrhage was immediately so excessive that packing had to be resorted to and the woman died within a few hours after removal from the table. Even the round ligaments could not be isolated from the mass of adhesions and the ovarian arteries could not be found. The only comparable condition which I have ever seen was a similar case of fibroid many years ago where the old electrical treatment had been used. In this case, however, no such treatment had been given. The adhesions here were the result of the degeneration of the tumor. The interest in the case really was on the medical side. The use of the x-ray in this particular tumor, taking into consideration its size and universal adhesions as suggested, would have been bad treatment.

DR. TUMEN (closing) said that with regard to the differentiation of the false from the true polycythemia, he used the term here because of the possibility of confusing it with a case of true polycythemia. There had been, he said, an excessive amount of blood found as shown by the blood count. The collateral circulation was probably so developed with the caval system that a blood count taken anywhere in the upper portion of the body would have shown an increase.

As to the possibility of operative hemorrhage, in most cases this does not seem to be a very great danger, because blood-letting was used so universally at one time.

Irradiation would probably not have been helpful, Dr. Tumen said, because in the event that the increased blood cells were due to venous obstruction, there would be no overactivity of the bone matter.

As to the question of whether or not we did have true polycythemia, this was not such a case. It was a case of the disturbance of the blood distribution.

DR. L. S. MCGOOGAN OF FALL RIVER, MASS., presented a paper (by invitation) entitled **Contracted Pelves and Disproportion.** (For original article see page 386.)

DISCUSSION

DR. JAMES W. DUNCAN, MONTREAL (by invitation).—May I be permitted, before discussing this very excellent paper, to draw your attention to certain important points. The Royal Victoria Montreal Maternity, in so far as the private wards are concerned, is an open hospital. A large minority of the private patients are delivered by nonmembers of the hospital staff. Complete statistics in these cases are, therefore, difficult to obtain.

The mortality for this whole series is an expression of the total fetal loss, without the slightest suggestion of selectivity. It is participated in by the general practitioner, the intern and members of the permanent staff.

The total number of cases studied by Dr. McGoogan was 5782 with a gross fetal wastage of 6.8 per cent. Subtracting the nonviable children and including all premature babies this figure would be reduced to 4.5 per cent.

Dr. McGoogan's series of 471 cases of labor in contracted pelves show us a gross infant loss of 51 or 10.8 per cent. Nine of these were monstrosities. Therefore, the actual preventable deaths were 42 or 8.9 per cent.

The question presenting itself to us is not how favorably do these results compare with those of other clinics, but rather, what changes may we introduce to improve our own.

Our attitude up to the present toward cesarean section has been a rigid one. Some may look upon us as radical in our conservatism. May I be permitted to enunciate it. We do not favor the trial of labor preceding the operation. Our trust in mercurochrome, associated with a DeLee or Beck operation is not deeply rooted. If the membranes have been ruptured or the patient in definite labor for two hours or more, we consider the route by this operation selectively closed. In fact, elective cesarean section is practically the sole method used for this operation in our clinic. Our procedure in all these problem cases has been the same. The use of Müller's test under anesthesia if necessary, and the decision in favor of induction, trial of labor, or an elective section is definitely and finally made. We are influenced, more particularly in young primiparae, by our own firm belief that "once a cesarean, always a cesarean." We frankly admit, that with a more surgical outlook, the fetal mortality might have been much reduced, but what of the maternal loss?

In rebuttal to the possible advocacy of a more liberal attitude, your attention may be drawn to a fetal loss which has been but 2 per cent above the low average of 6.8 per cent for the total clinic of nearly 6000 cases, and on the other hand too much emphasis cannot be placed on a total maternal mortality of 2 or 0.4 per cent.

One of the most instructive features of Dr. McGoogan's effort is the demonstration of the flat and funnel pelvis as the chief offenders, the flat pelvis contributing 51 per cent and the funnel 18 per cent of the fetal death rate. A strik-

ing point exhibited in this paper is that all losses in the funnel pelvis series had an associated posterior position. The development of a small baby by the generally contracted woman is not only interesting but assuring.

The futility of depending upon any artificial method of delivery, by forceps or version, with the hope of justifiable success is thoroughly exposed. Dr. McGoogan has exhibited the success of induction. In future we will be more influenced by the experience.

The head will, in future, have to respond more readily to Müller's test in the flat pelvis, and the complete rotation of the posterior position of the occiput will be a matter of insistence in funnel pelves before the head reaches the outlet. Consequently, both induction of labor and elective section will, without doubt, be utilized more frequently in the future.

DR. NORRIS W. VAUX said he quite agreed with Dr. Duncan on the question of cutting down fetal mortality by use of breech extraction and of Dr. Piper's after-coming head forceps. There was also a great saving of lacerations of the cervix and perineum. He did not think, however, that they quite agreed as to the time to do such delivery. He thought that if the case was allowed to go along until the cervix is dilated with the membranes unruptured and until it is definitely certain that the position is posterior, then it is much better not to let the delivery wait too long. When, however, ruptured membranes are found at the onset of labor with a rather large child, he lets them go ahead and never attempts to do a version in such cases, except where obliged to do something to effect delivery. He usually rotates the head manually or with the Tucker-McKlane forceps or the Piper forceps. He said he heartily agreed with Dr. Duncan that version should not be done except as a last resort.

DR. WM. R. NICHOLSON said that in his experience of ruptures following cesarean operations, these occurred in three cases before the women went into labor, or before labor had progressed far enough to either rupture the membranes or cause any dilatation of the cervix. His belief is that rupture depends primarily upon the situation of the placenta in pregnancies following previous cesarean sections. If the placenta is not in relation to the old wound, the majority of cases which have had previous cesareans can be delivered vaginally with safety. On the other hand, if the placenta develops immediately upon the inner surface of the old wound, the tendency of the syncytial cells to invade the uterine wall so weakens the scar by absorption that rupture is very probable. Dr. Nicholson does not believe that induction of labor is as frequently indicated as the essayist's statistics indicate. His belief is that except in cases of toxemia, induction either for contracted pelvis or postmaturity is very rarely indicated. He felt that any man who has had sufficient training in obstetrics can determine after seeing a woman in early labor for a few hours whether it is better to deliver by vagina or by cesarean section. This is a different attitude from that held by those who advocate a true test of labor. In other words, it is impossible until a woman has had marked second stage pains for a longer or shorter time, to absolutely determine whether the head will or will not eventually enter the pelvis, but it certainly can be told before the so-called test of labor has been given as to whether it is better in any individual case to deliver by abdominal section or through the vagina. That one is willing to advocate an abdominal section for a kinked appendix, as the better method of treatment, and yet so unwilling to advocate a cesarean section at the time which is proper for its performance, namely early in labor, is rather a remarkable proof of the lagging of obstetrics behind abdominal surgery. Of course, such a decision presupposes real obstetric knowledge, which can only come through long experience, and it goes without saying that some needless abdominal operations will be performed. It is further to be always remembered that

we are discussing this subject as experts in obstetrics. The ordinary practitioner has no business with obstetric complications and is no more competent to safely induce labor than he is to perform a cesarean section or to decide upon the indications for either procedure.

DR. COLLIN FOULKROD said he thought it would be stimulating to collect such statistics in Philadelphia from the standpoint of the Montreal attitude. There were one or two points that differ so much that he felt it would be very interesting to discuss them.

One was the question of why so many babies died from intracranial hemorrhage, as it was rather higher than one would expect, particularly with the use of low forceps. He would like to know what type of forceps were used. He also said he was sure that a long labor was more likely to produce intracranial hemorrhage.

With regard to the induction of labor, he said it had grown to be rather an unusual practice to induce labor for other causes than toxemia. It seems to be the Philadelphia attitude to have discarded the use of the induction of labor as based on any classification of the pelvis from a record of the conjugate vera.

The question of whether to do a section in subsequent pregnancies usually depended upon whether the patient showed a temperature indicating any morbidity when convalescing from the first section. Whereas he said there had been many cases where a woman had had cesarean section for some condition, and yet had had two or three babies subsequently. Once a cesarean did not mean always a section.

DR. JOHN A. McGLINN said that in instances of very young girls with very small pelves, the baby also is usually contracted and as a rule such cases do not give much trouble, so that he felt there was no greater incidence in the generally contracted pelvis than in the normal case. The funnel or simple flat pelves were usually amenable to cesarean section. He said he advocated the Beck or Kerr sections, as he felt they both gave a better chance to both mother and baby, and not one alone.

DR. DANIEL LONGAKER said he was certain that if the Kielland forceps were used, intracranial hemorrhage would be entirely avoided. He was equally certain that the sad tale of the dead and the crippled baby was directly due to the use of ordinary forceps and the impossibility of correct application and therefore the intracranial hemorrhage!

DR. McGOOGAN (closing) said that with regard to induction of labor in these 56 cases out of 471, or 56 cases out of 251 operative cases, this was part of the teaching in Montreal, and that in a good many cases it was thought better to induce labor at the eighth or eighth and a half month, especially in young women, than to do a cesarean section.

With regard to intracranial hemorrhage, he said he was sure the question cannot be answered as to whether this is due to the contracted pelvis or to the forceps. He said that at the Royal Victoria Hospital they did not use the Kielland forceps.

Department of Book Reviews

CONDUCTED BY ROBERT T. FRANK, M.D., NEW YORK

Review of New Books

A beautifully illustrated and gotten up book, *Die weibliche Brust*,[1] dealing with the female breast, including its hygiene and a retention of its form, has been produced by Gläsmer and Amersbach. The introduction to this volume is by C. Menge. The main object has been to present both the medical profession and the laity with an understandable brochure whose object is mainly the prevention of the diseases of the breast by means of preventive measures. Exercise and recognition of malignancy are also dealt with. The illustrations are most instructive and artistic.

—*Robert T. Frank.*

Dr. Ray has compiled in this pamphlet, *Some Problems of the Medical Profession in India*,[2] a number of addresses, resolutions, and editorials regarding some problems of the medical profession in India. These problems relate not only to the native medical profession but also to the Indian Medical service. The greatest of the problems is apparently that of the present situation of the native Indian practitioner educated in medicine in India. It is difficult for us to realize the situation under which these men work, due probably to the parallel civil and military medical services in India. The native practitioners have asked for a separate Medical Council for India and for recognition by appointments in the Medical Research Institute which would lead to promotion. It is interesting to note that a new central Medical Research Laboratory has been founded under a grant by the Rockefeller Foundation. Other problems of medical interest, in hygiene and sanitation, are discussed.

—*Philip F. Williams.*

Dr. Peterson presents an excellent small *Manual for a Demonstration Course in Obstetrics*.[3] Since he has introduced a large amount of clinical practice the book might well serve, not only as a manual for Manikin courses, but also as a practical obstetric help for the student and the general practitioner.

—*Philip F. Williams.*

The present third edition of this textbook on obstetrics, *Lehrbuch der Geburtshilfe*,[4] edited by Dr. W. Stoeckel, bears evidence of a critical revision.

The present edition is revised by the same authors who wrote for the previous one, except Opitz and Reifferscheid, who have died in the interim.

There is an ample discussion of the advances in the physiology of the reproductive organs of the female, menstruation, early pregnancy changes, and the interrelationship of the various endocrine glands. Later in the chapter on physiologic biology of pregnancy, the changes and influence of the anterior pituitary body are taken up in detail, with reference to Zondek and Aschheim's work.

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[1] **Die weibliche Brust.** Von Dr. Med. E. Gläsmer u. Dr. Med. R. Amersbach. Mit einem Geleitwort von Dr. med. C. Menge. Ferdinand Enke, Stuttgart, 1929.

[2] **Some Problems of the Medical Profession in India.** Compiled for the All-India Medical Association by Dr. Kumud Sankar Ray. India, 1930. The Indian Daily News Press, Calcutta.

[3] **A Manual for a Demonstration Course in Obstetrics.** By Reuben Peterson, A.B., M.D., F.A.C.S. Edwards Brothers, Ann Arbor, Michigan, 1929.

[4] **Lehrbuch der Geburtshilfe.** Von Prof. Dr. W. Stoeckel. Dritte Auflage. 614 Abbildungen im Text. Verlag von Gustav Fischer, Jena, 1930.

Walthard in his section on asepsis and antisepsis in obstetrics, discusses the relative merits of rectal and vaginal examinations in labor, and gives the statement that maternal morbidity is six and one-half times as great following vaginal examination as when the course of labor has been followed by rectal examination. He also brings out other means and measures to reduce maternal morbidity and mortality.

Döderlein's contribution consists of an excellent and rather unusual chapter on the medicolegal aspects of obstetrics.

Ottow in considering the therapeutics of labor strongly advises caution in the use of extracts of pituitary gland during labor; he discusses the dangers and limitations of this and similar drugs and the accidents resulting from their use. He has culled from the literature, also, adverse reports on two rather recently offered drugs, one a substitute for pituitary solutions and the other a substitute for ergot. A comparison of these reports with the advertising literature of the manufacturers is interesting.

The teaching recommended is for the most part conservative, a modified Stroganoff technic for convulsive toxemia, cervical cesarean practically always where section is indicated, no fulsome praise for the Kielland forceps.

The illustrations are the usual excellent German work, many are cuttings from motion picture films of actual deliveries, which permits a very exactly timed illustration for a corresponding point in the text. It is of interest to note that there are more illustrations adapted from De Lee's textbook than there are references to American literature in the voluminous chapter bibliographies.

—*Philip F. Williams.*

In the *Foundations of Experimental Psychology*,[5] edited by Carl Murchison, we welcome a really living book dealing for the most part with actual pieces of research in an attempt to "clean the débris from the intellectual decks of psychology." It is at the same time comprehensive and compact and the form leaves nothing to be desired. The outstanding note that is struck is one of modesty and the fullest realization of present-day limitations imposed by insufficient data and the complexity of the factors involved.

This book should serve not only as a record of the present status of each of the specialties of experimental psychology, not only as a guide to the prospective investigator, but as a complete textbook including in its 900 pages a thoroughly adequate perspective of the whole subject. In addition it is a source of pleasure and stimulation to the student, young and old, in any field of scientific investigation, in that it delimits so cleanly the various logical possibilities and impossibilities of proof.

The men cooperating in this well-rounded symposium form an illustrious roster of workers, each of whom, in turn, has to his credit a large zone of research influence. There are few if any fields of science in which the country can be more justly proud of its representation.

The reviewer would like to call special attention to the clarity of T. H. Morgan's epitome of the present status of the rôle of Genetics concerning the glands of internal secretion. Morgan's entire article is a model of succinctness. W. J. Crozier's mathematical approach to the study of living organisms will prove of value to the advanced student. In his chapter on The Mechanisms of Reactions, Alexander Forbes has very well formularized an enormous amount of material. Among the chapters devoted to special sense organs, the one on the Nature of the Photoreceptor Process by Selig Hecht, is particularly stimulating. W. B. Cannon's chapter On Hunger and

[5] **Foundations of Experimental Psychology.** Edited by Carl Murchison. Clark University Press. Worcester, 1929.

Thirst is briefer than it might have been; this was undoubtedly due to the fact that it was completed at extremely short notice.

The section on the Neuro-humoral Basis of Emotional Reactions includes a number of points of interest to clinical neurologists as well as some checks upon the more enthusiastic behaviorists. K. S. Lashley in his discussion of the Nervous Mechanisms in Learning, emphasizes particularly the great necessity of accumulating far more data to supply the present lack. W. S. Hunter's description of the Experimental Studies of Learning again serves to indicate the difficulty of the subject rather than clarify the atmosphere. One would expect in such a bibliography as is quoted a somewhat greater emphasis on the evaluation of emotional factors in learning.

One can only marvel that Arnold Gesell's summary On Infancy compacts his fascinating contribution in so narrow a space. This and the subsequent chapters by R. Pintner and F. N. Freeman make excellent, authoritative reading on the subject of mental tests.

Mark A. May had a most difficult task in his attempt to complete the subject on the Adult in the Community in 50 pages. In this chapter as well as in those by C. Wissler on Conflict With the Survival of Cultures and by S. I. Franz on the Abnormal Individual, there has been a shifting from genuine experimental psychology to a plea for the utilization of experimental psychologic methods. Here the reviewer regards their evaluations of the Freudian contribution really quite inadequate, and their bibliography uneven, if it be intended as a guide for the student. Franz's discussion of psychiatric problems, hysteria for instance, would be misleading for the novitiate and quite unsatisfying to the experienced observer.

—*Max D. Mayer.*

This is an excellent book, *Sa maternidade, conselhos e suggestoes para futuras mais,*[6] for the expectant mothers. It is well written and contains many indispensable suggestions on prenatal care. On account of the high infant mortality in Rio de Janeiro, of 184 in 1925, as compared to only 64 in the same year in New York City with its high foreign population, there is no doubt that this little volume will serve a most useful humanitarian purpose. The subject matter is divided into eight chapters and covers in simple language the physiology of pregnancy, and care of the infant.

—*Julius E. Lackner.*
—*Sydney S. Schochet.*

Voltz presents in his book, *Die Strahlenbehandlung der Weiblichen Genital-Karzinome, Methoden und Ergebnisse,*[7] a very complete and detailed analysis of 3,500 cases of carcinoma of the female genital tract treated solely with rays during the past seventeen years at the München Universitäts-Frauenklinik.

In his introductory note, Prof. A. Döderlein favors the ray therapy of genital carcinoma and thinks it should replace the operative treatment.

Voltz also includes in his book the methods and experiences of other large clinics, such as the Radium Hemmett in Stockholm and the Radium Institute of Paris. There is a report of several members of the Radiologic Commission, formed in 1928 to study the ray treatment of malignancy, especially of the female genital tract.

He gives a very detailed description of the technic and dosage used at the München Frauenklinik. The series are eight weeks apart. Usually two series suffice.

[6] **Sa Maternidade, Conselhos e suggestoes para futuras mais.** Dr. Arnaldo de Moraes. Rio de Janeiro. Graphica Sauer, de Fred. H. Sauer. 1930.

[7] **Die Strahlenbehandlung der Weiblichen Genital-Karzinome. Methoden und Ergebnisse.** Prof. Dr. Friedrich Voltz, Leiter der Strahlenabteilung der Universitäts—Frauenklinik, München, 1930. Berlin, Urban and Schevarzenberg.

At the first series, the hypophysis is rayed in order to make the cancer cells more sensitive to rays.

Since 1917, every carcinoma patient gets an injection of 10 c.c. of Dextroid. This causes the cancer cells to become more sensitive to radium and x-ray.

He devotes a chapter on the results in his clinic and another on the results from the world's literature.

Dr. Heymen gives a résumé of the technic and the results of treatment at the Radium Hemmett in Stockholm, while Dr. Lacassagne describes the technic at the Radium Institute at Paris—locally, with radium, and with deep x-ray and radium.

This book is the last word on the ray treatment in carcinoma of the female genitalia. It is scientifically written, a clear statement of results, and a very valuable addition to the literature on x-ray therapy of carcinoma of the female genitalia.

—*Julius E. Lackner.*
—*Sydney S. Schochet.*

Dr. Fekete attempts[8] neither to write a textbook, nor a special treatise on gynecology or obstetrics. He writes on the relationship of gynecology and obstetrics to the general organism and also covers problems in gynecology and obstetrics that are only superficially touched upon in the average textbook.

The chapters on the anatomy and physiology of the uterus, tubes, ovaries, and vagina are handled in an interesting manner. Fekete emphasizes the importance of a closer relationship between the physiologist and the gynecologist and obstetrician.

Sterility has not been given much importance. The chapters on the relation of the endocrine system and the central nervous system to the female genital system are very interesting and instructive. The subject of sex hormone is discussed in a very sensible manner.

Probably the most significant and most complete chapter in Fekete's book is that on the metabolic changes during pregnancy, which are discussed in great detail.

This book is well written and contains many enlightening discussions of gynecologic and obstetric questions.

—*Julius E. Lackner.*
—*Sydney S. Schochet.*

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[8]**Die Funktion der Weiblichen Geschlechtsorgane und Ihre Beziehungen Zum Gesamtorganismus.** Dr. Alexander V. Fekete, Privatdozent Oberarzt der Graf-Apponyi-Poliklinik in Budapest. Berlin, 1930. Verlag Von S. Karger.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Cesarean Section

Winter, G.: The Collected German Cesarean Section Statistics for 1928. Zentralbl. f. Gynäk. 53: 1874, 1929.

Statistics on 4450 cesarean sections were collected as follows:

INSTITUTIONS:	NUMBER OF INSTITUTIONS OF EACH KIND	NUMBER OF SECTIONS	ENTIRE MORTALITY PER CENT	MORTALITY DUE TO OPERATION PER CENT
University clinics	25	1178	8.6	5.3
Midwife institutions	20	786	6.6	3.8
Public institutions, no instruction given	22	410	5.0	2.9
Hospitals with obstetrical clinics and an obstetrician	106	1093	6.9	3.5
Hospital without obstetrical clinics and without obstetricians	125	609	7.0	4.6
Private obstetrical clinics	70	337	6.2	3.6
Private surgical clinics	11	37	5.4	5.4

In the 4450 operations, the average of mortality was 7.1 per cent. Causes of death were divided as follows:

Death due to the disease or the condition for which the section was done,	120 or 2.7 per cent
Death due to the operation alone,	185 or 4.2 per cent
Death due to intercurrent disease,	11 or 0.3 per cent

Of the 185 deaths due to the operation itself, 53 per cent were due to infection, and 15.1 per cent due to emboli!

The whole series was further divided to show the results in (1) cases which were afebrile at the start of the operation, and (2) cases infected at the start. The mortality in Group 1 was 6.4 per cent and in Group 2, 27.0 per cent, showing definitely the danger of cesarean section in infected cases.

When the cases were grouped according to the type of operation employed, the following was found:

Intraperitoneal cervical section	employed 3354 times, mortality 3.7 per cent
Intraperitoneal "classical" section	employed 438 times, mortality 6.4 per cent
Intraperitoneal fundal section	employed 34 times, mortality 8.9 per cent

thus showing that the intraperitoneal cervical section, of all the operations, is the safest.

In the infected cases:

114	operated with cervical section, there was	25 per cent mortality
23	operated with extraperitoneal section,	30 per cent mortality
9	operated with Porro section	44 per cent mortality

In the 4450 cesarean sections there was a fetal mortality of 403, or 9.0 per cent.

It was difficult to get statistics on the condition of the child before the beginning of the section, but the following was established definitely: 175 of the babies were dead before the section was started. Of the remaining 228 it is certain that some of them were not in good condition at the start of the operation.

The indications for abdominal cesarean section in the main were divided into the three great groups: contracted pelvis, eclampsia, and placenta previa. These groups comprised three-fourths of all the sections. Many and divers indications, some of them quite weird, made up the rest.

The general mortality then was 7.1 per cent, with 4.2 per cent actually due to the operation itself. Winter says that there is no vaginal operation that approaches anywhere near to this figure.

WILLIAM F. MENGERT.

Gauss: The Approaching Decline of Cesarean Section (Kaiserschnittdaemmerung). Zentralbl. f. Gynäk. 53: 1154, 1929.

The indications for cesarean section are divided into two groups: maternal and fetal. Under "maternal" are classed contracted pelves of severe grade and severe incurrent organic diseases (heart, lung, kidney). Placenta previa and eclampsia are classed as fetal indications because maternal life is conserved equally well, if not better, by methods other than section. The author denounces cesarean section for fetal indications on the following grounds:

In a series of 941 pregnancies occurring after previous sections, only 25 per cent had a spontaneous birth and 57.5 per cent had another section. In a series of 79 women with 1 previous section, only 58 per cent became pregnant again. This percentage drops to 15 after two previous sections and to 3 after three previous sections.

Ten per cent of all women having the first section, 13 per cent at the second section, 36 per cent at the third section, and 100 per cent of all women having four sections were sterilized at the Universitaets-Frauenklinik at Wuerzburg.

The collected result of all this is that a marriage in women in whom sections are done produces only 1.8 children, whereas the productivity of a single marriage in order to maintain the population should be 3.46 children. The author, therefore, concludes that a section done for a fetal indication, i.e., placenta previa, eclampsia, is not justified because the life of a single child (except in very exceptional cases) is nothing compared to preserving the health, fertility, and the ability to bear children in the natural way, of the parturient woman.

WILLIAM F. MENGERT.

Ponomareff, A.: Cesarean Section in Russia. Gynéc. et Obst. **18**: 103, 1928.

This is a statistical review of all available records of cesarean sections. From 1881 to 1890, 61 cesareans were performed with a mortality of 50 per cent; from 1891 until 1900, 125 with a mortality of 17.6 per cent; from 1901 to 1924, 803 sections are recorded with a mortality of only 7 per cent. This gives a total mortality of 12.6 per cent with a marked decline in the mortality of each successive decade. Saenger's classical operation was performed in 901 cases with a mortality of 10.7 per cent, the Porro operation in 76 cases with a mortality of 29 per cent. Where repeated sections were done there was a mortality of 12.7 per cent for the

first operation as compared to 6.2 per cent for the second operation. A third operation was performed only in three cases with a single death. In the total series of 1,017 operations, 905 babies were known to have been born living, 23 were dead.

There were 298 sections performed subsequent to the rupture of the membranes with a maternal mortality of 22.1 per cent, while in 439 operations performed prior to the rupture of the membrane the mortality was only 5.4 per cent.

GOODRICH C. SCHAUFLER.

Piper, Edmund B., and Bachman, Carl: Corporeal and Cervical Cesarean Section. Surg. Gynec. Obst. 49: 547, 1929.

A comparative analysis of results in cervical as contrasted to corporeal cesarean section appears to justify the following comments:

When the conservative operation is performed through a low uterine incision there will be found to be little difference in immediate convalescence as contrasted with that of the cervical section, if both are done as elective operations before labor. After the onset of labor there will be some advantage as to safety, febrile morbidity, and other factors of convalescence in favor of the cervical section. The advantage in the authors' hands up to this time has been so slight, however, that while hesitating to recommend a stand which would be at odds with newly reported experience in other quarters, they believe that there is yet hope for increased safety in the relatively simple corporeal operation after the onset of labor. While no assurance of safety in section removes the necessity for good obstetric judgment in the conduct of cases of questionable disproportion, surgeons who now resort to elective section in preference to the risks of operation late in labor, or because of the difficulties of the cervical section, may find it possible safely to employ test labors more frequently. By so doing they may find a further gratification in a diminished necessity for resort to section generally.

As for the thesis now advocated that the cervical section should replace the corporeal operation as a routine method in all cases requiring operation, the authors' results would suggest that the decision might conceivably be made upon other grounds than the alleged greater safety and smoother convalescence of the cervical section. For the practical obstetric surgeon there is the theoretical advantage that the scar of the cervical section, situated as it is in a quiet sector, is less apt to rupture in subsequent pregnancy and labor.

WM. C. HENSKE.

Süssmann: Two Rare Cases of Rupture of Uterine Scar Following Cervical Cesarean Section. Zentralbl. f. Gynäk. 53: 410, 1929.

Inasmuch as the rupture of scars of cervical or low flap cesarean section is relatively rare, the following two cases are reported.

Case 1.—Para ii, rachitic flat pelvis, diagonal conjugate 10 cm., previously delivered by cervical section, had labor pains ceasing spontaneously one week before elective section for the present pregnancy. Part of the placenta protruded through the old scar. Mother and child survived. Case 2.—Para v. Three normal deliveries and then a cervical section for placenta previa with the fourth pregnancy, followed by a temperature of 101.5° postpartum. She became pregnant again and bore down with the onset of labor pains. A sudden, sharp, severe pain ensued and fetal movements ceased, not to recur. On admission the abdomen was rigid and fetal heart sounds were absent. Laparotomy showed the fetus and placenta free in the abdominal cavity. Death occurred on the ninth day from general peritonitis. Both the laparotomy and the autopsy findings proved that this was not a primary abdominal pregnancy.

WILLIAM F. MENGERT.